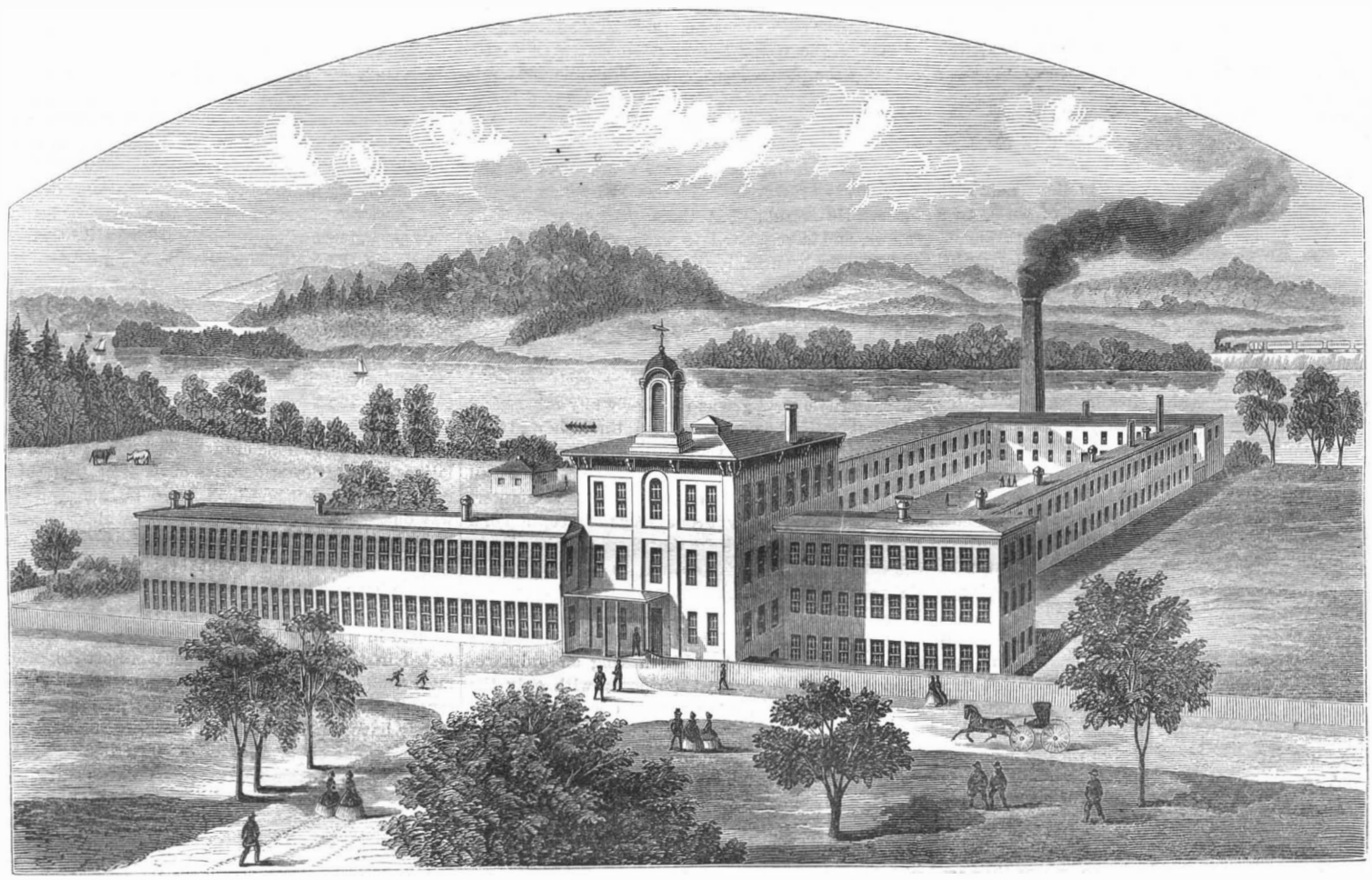
Scientific American.

A WEEKLY JOURNAL OF PRACTICAL INFORMATION IN ART, SCIENCE, MECHANICS, CHEMISTRY AND MANUFACTURES.

VOL. VIII.—NO. 15. (NEW SERIES.) | NEW YORK, APRIL 11, 1863. | SINGLE COPIES SIX CENTS. $3 PER ANNUM—IN ADVANCE.



THE FACTORY OF THE AMERICAN WATCH COMPANY.

It has been our aim to present, from time to time, a faithful record of the progress of our nation in the mechanic arts, and of other manufacturing processes, by which the best interests of civilization are advanced. We have been chary of awarding praise indiscriminately, believing that such a course, so far from being beneficial, in any sense, would re-act injuriously on the public mind. To our thinking, there is no fame more desirable to any people than that which arises from so perfecting the science of invention that human muscles are supplanted by steel and iron; and that the heat and burthen of the curse, transmitted through generation after generation, is mitigated in its severity by delegating insensate tools for the rack and strain of the brain and sinews of the body. This is one advantage in favor of the adoption of machinery for general purposes, but another and far more powerful one is the fact that man, with all his cunning, cannot do what a machine can. He cannot multiply parts so quickly, nor with such unerring accuracy as can the machine which he has taught to perform his work. The eyes fail, the hands cease their task, the body faints from excess of weariness, and lo! the artificer who in general is expert and reliable, commits an error and destroys not only the value of his own time but of all others who preceded him. Therefore, while we might rely for tolerably accurate work upon manual skill, when we require faultlessness we must resort to machines and instruments that move in obedience to known laws, and which can no more fail, provided they are based upon these principles, than can the sun or moon in its appointed orbit; and this assertion, as the sensible reader well knows, is as susceptible of sound logical demonstration as any other fixed law of nature. In brief, then, accurate machinery is the result of the adoption in mechanics of the natural laws and principles which govern the motions of matter; the combinations of these laws constitute the ingenuity which is displayed in the constructions of the individual machine. Since machinery has become so universal an agent in the reduction of crude and raw material into the various manufactured articles of commerce, it behooves us to see how far and how profitably its introduction can be effected into new and untried fields—to discover, if we can, what other tracts, as yet fresh and unexplored, are lying fallow, ready for the insertion of the inventive skill of the country to make it productive of lasting good.

We recently paid a visit to the American Watch Company's factory, at Waltham, Mass., with the express desire and intention of satisfying ourselves by ocular evidence how far the encomiums which have been lavished upon those works were deserved, in a mechanical point of view. In this article we propose to review the American watch in the light of a combination of delicate parts fabricated mainly by machinery, and the fitness with which tools execute those operations which where formerly thought impossible to do by them. "A watch made by machinery!" exclaims the superficial thinker, "that must be a curious affair, and one not very valuble as a timekeeper." To which we reply, that this is not at all an uncommon error, and one which is, as we can show, baseless.

The American Watch Company's factory, the only place in the country where watches are made in any numbers, consists of an irregular aggregation of buildings, two or three stories high, and situated in a pretty location on the bank of the Charles river, a short distance from the town of Waltham. The works are carried on by an incorporated company with a capital of $300,000, all paid in. There are about 450 work-people, of both sexes, employed in the several departments, and at the time we saw them they were working away with an assiduity that was cheering to witness. Very little manual labor, recognized as such mechanically, is done by these people on the watch, except in the operation of putting it together; it is true that they supply the material to the lathes and other tools which do the work, but their presence is simply necessary to control and direct the action of the machinery which makes the several parts. We must not be understood as saying that *no* laborious work is done in the factory, or that the positions of the artisans are

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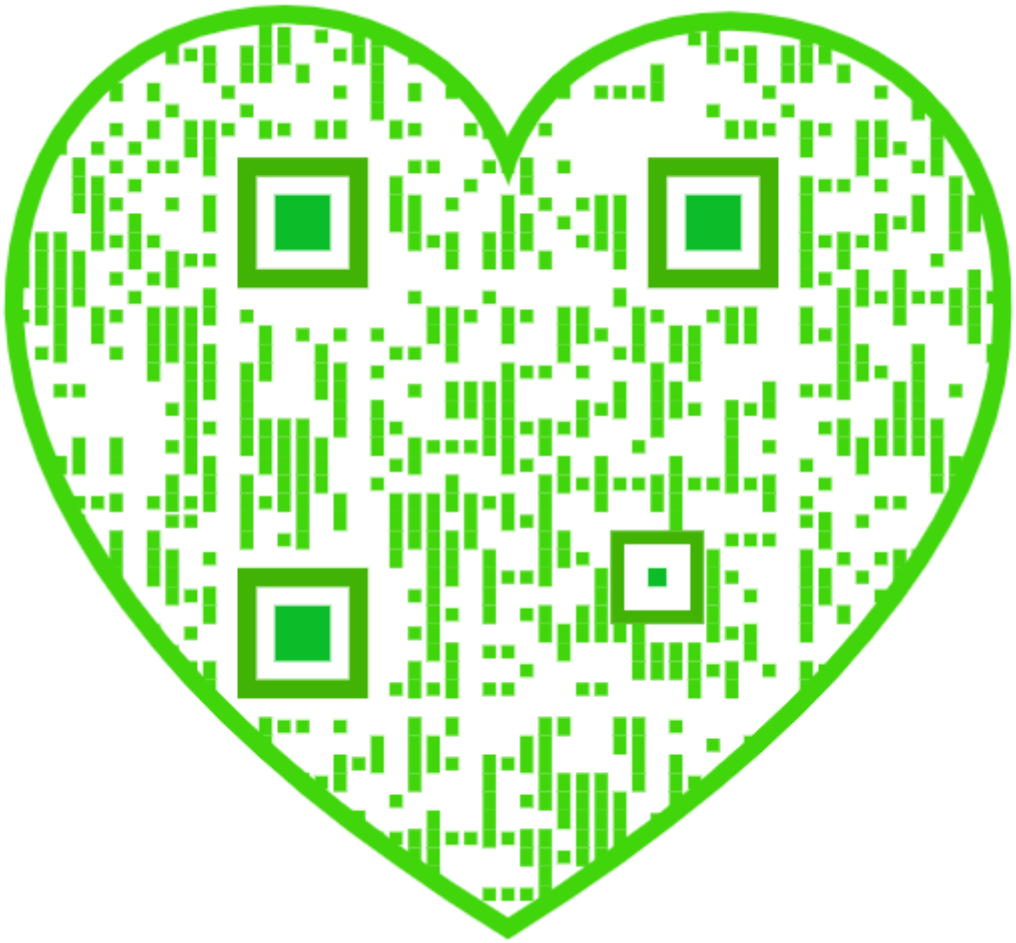

sinecures; but we desire to convey the idea that, in this factory, tools do those intricate and delicate parts which, in foreign countries, are constructed principally by hand. In all well-conducted mechanical operations there must be order and simplicity, and, in accordance with this well-known law, we find that the Watch Company have divided their factory into several departments, to each of which certain parts of the watch are assigned. All the brass plates and pieces of similar metal which enter into the composition of the watch, are done in one room, under the supervision of one foreman. The train—which the uninitiated will understand to be the works—complete, from the barrel to the fourth wheel, is made and finished in another room under another foreman. The manufacture of the escapement is a separate detail, confided to still another foreman, and so on, through every particular, until the watch is all parcelled out among the different foremen. There are also rooms devoted to getting out the stock in steel and brass in a crude state, preparatory to subsequent operations, and other workshops where the jewels are made from the rough gems, where the dials and hands are made, where gilding is done, &c.; and the whole factory comprised in these several operations is directed by the treasurer, Mr. R. E. Robbins, who has entire control over it.

The system of duplication is practiced here with most excellent results. A quantity of parts, in a certain stage of progress are given to one workwoman, say some small pinions, for instance, to be forwarded another stage, and of these she does several thousand before taking another lot. Out of this number possibly a dozen of them will be spoiled, from some inherent defect in the metal, or fault in the cutting tool, but, in general, all which were taken from the foreman are returned. Now let us look at this point; here are some pinions (they are small shafts with a pivot turned upon each end, and perhaps one fourth of an inch long from end to end), of which the workwoman takes the quantity mentioned, and yet is able, by the perfection of the machinery, to return all that she had taken away, without loss. Conceive of the manual dexterity and skill which would be required to obtain the same results! But this is not all; the pinions are *perfect;* not only as regards the division of their teeth, but also in that smoothness of surface which is so essential to nice-working machinery. This principle of accurate duplication may be clearly understood when we say that if the company desire to make 5,000 full-plate Bartlett movements, they give the order in the various shops to get out the pieces required for them. The work is given out, and the 5,000 are finished in detail and put together without selecting one part to fit another. The pieces are taken indiscriminately from the several departments to the final one, where they are put together and adjusted; and they rarely fail to fit correctly and accurately. This is, not to multiply phrases, simply marvelous. Let the reader take out his watch and examine the wheels, the pivoted and leaved pinions, the jewels so nicely fitted, the steel work of all shapes, the expansion balance, &c., which enter into its composition; let him mark particularly the elaboration and exquisite cunning which is displayed in this, the most beautiful of all man's workship, and he will fully appreciate the value of the principle that the company employs, and which we hope we have made clear. All the holes in which the jewels are set must be at an unvarying distance from each other in every plate, from the first up to the five-thousandth. If they were not similar, the adjusters, when they came to put the movements together, would be obliged to throw some of them on one side, and they would be consequently lost.

The machinery by which all the watch movements are manufactured is made on the premises, and displays constructive talent of the highest order on the part of the company's mechanics; and it will only be necessary to inform the mechanical reader that the wheels and pinions, with the finest pivots, of the American watch, are all made by regular and legitimate mechanical tools. The operations are, in fact, only those of an ordinary machine-shop in minature. The pinion pivot of a watch is turned in a slide lathe in the same manner that the shaft of a steamboat is. The wheels, or gears, as a machinist would call them, are formed in a cutting engine, just as are the largest gears on an engine lathe. And so every operation can be recognized, even by those unfamiliar with watch-work, as being in a direct line closely allied to the natural and established rules by which ordinary machinery is produced.

We should like very much to tell our professional readers about some of the wonderfully minute transactions that are carried on here. As, for instance, the screws that are made to retain the jewel settings in place; the jewels answer the same purpose in a watch-movement that the step and box do under a mill-wheel shaft. The jewels are placed in brass or gold settings which fit into holes drilled in the watch plate for them; where the plate and setting join a hole is drilled and tapped and has a screw inserted in it so as to keep the jewel setting in place and prevent it from altering its position. Let us dilate a little upon those minute screws in order that we may understand better the accuracy so faithfully observed in the mechanical details of the American watch. Screws of different sizes are used in the watch, but we refer only to the smallest. When we speak of screws the natural impression conveyed to the mind by the phrase is something tangible and real; but these screws seem almost a mockery of terms, or a wild delusion of the inventive brain, rather than any sober, sensible piece of work. The observer, going through the factory, sees some young women very busily employed with a small wire running in a lathe. He is told that these persons are making screws, and is requested to examine some of them and see how beautifully they are made. The visitor takes up a small box by the side of the lathe, and, looking it it, is rather disposed to consider himself the victim of a practical joke, as the contents resemble nothing in the world so much as rifle powder. He may be pardoned for some scepticism as to the fact of these little steel grains possessing any value—and it is not until they are examined through a strong magnifying glass that they resolve themselves into actual *bolts* (we may now call them), possessing all the features in common with other screws, countersunk heads, threads and grooves for the reception of a screw-driver. We dare say that there may be pins in the world having heads as small as one of these little screws, but we assert that we never saw any. We have also said that these screws have threads; they have, and the general details of their production are the same as those employed in making an ordinary-sized bolt for mechanical purposes, with only the exception that these minute specks are much more perfect than the larger ones generally are. These jewel screws are made out of steel wire; they are, as we have seen, turned in a lathe, have threads cut on them, and are finally separated from the main "rod" by a cutting-off tool. Before they are cut off the wire, however, they are screwed into a plate provided with holes tapped for their reception, and put into a machine which saws grooves in them for the screw-driver. These screws are then hardened and blued, fifty-two of them weigh one grain, and about 300,000 weigh one pound! The threads are cut with dies, and these dies are threaded with a machine-made tap—that is, one cut in an engine lathe. There are 240 threads in an inch, which is a fineness of division invisible to the naked eye. The market value of a pound of such screws is about thirty-six hundred dollars! The manufacture of screws forms only a small part of the mechanical wonders of the factory, and, to avoid prolixity in our article, we shall only advert to one more process connected with the manufacture of the American watch.

Let us look at this pallet and escapement-wheel which goes into the more costly kind of movement made by the American Watch Company. It does not seem possible, even to the professional observer, that these delicate little (fibers we had almost said) pieces of steel could be worked up to their present state by aid of machinery. A breath would blow the pallet itself so far that no one but a watchmaker—who can see things that a microscope cannot reveal—could ever find it. We say let us examine the pallet, for here we have the fac-simile of it impressed on paper; it is only the outline, and conveys a very poor idea of the beauty of finish and symmetrical appearance which distinguishes the real article. All of these delicate lines and curves are produced mechanically; and as we have no tools in our office to measure anything so slender, we fear greatly that, viewed by the watch-making standard of perfection, we have produced but a clumsy pallet; all the distances are arbitrarily proportioned, and must be the same in every one made, from the first up to the one-thousand-and-first. The slots or recesses seen in the cross-bar are intended for the reception of the jewels, which play in the teeth of the scape-wheel; the angles of these slots with reference to the body of the pallet must be alike in each one; and to secure this end, it is firmly fastened in a "holder" (which is of itself a very ingenious tool), and then placed in a machine. In the proper position there is a "lap" running at high speed, charged with diamond dust and oil, which cuts away, in its polishing, the hard steel until the requisite size and shape have been attained. So also with this little scape-wheel; the teeth which are disposed around its circumference are beautiful in their correct proportion and finish. The cutters which shape the teeth out of the solid metal are sapphires, ground down to the proper shape with diamond dust and oil, and then inserted in small wheels or disks; they thus constitute an imperishable sort of milling machine which neither alters nor deteriorates for a very long time. We examined these small cutters—our mechanical readers will see, from the size of the teeth, how minute they must be—and found their edges as keen and perfect as possbile; and we were told that they had cut many thousands of wheels, but, although frequently measured to test them, had never altered materially. The brass is very hard, and when the wheel comes out of the cutting engine it has a very fine polish on its several faces.

But let us have done ere we exhaust all our superlatives and are deemed guilty of exaggeration. Let us leave the pallets and look for a moment, on our way out, at the gages or measures by which the sizes of the smaller parts of a watch-movement are determined. Here are a different system of gages from any we have seen before. It is obvious that those standards which insure accuracy by fitting could not be used in watch-work, the pieces are too small to be tested in that way, and we must resort to other means. The condition of absolute rectitude in the several parts is arrived at by multiplying the errors it may have, many times; as, for instance, by means of a micrometer or its equivalent. The angles of the pallet, for example, must be similar; and, as they approach completion, they are put into an instrument which magnifies any inaccuracy so much that the thirtieth part of the thickness of a human hair can be readily detected! In the teeth of the scape-wheel we can, by means of instruments, observe the slightest deviation from the correct proportion, and rectify the error, if there be any. So finely do the sapphires cut, that the "chips" which they can remove are, as we have seen, only the thirtieth part of a hair in thickness, and this infinitessimal portion can be taken from any part of any tooth, so easily are their motions controlled. We have often heard people who were desirous of conveying a clear idea of nice workmanship say that this or that was not a hair's breadth out of the way, but what figure of speech shall we adopt when we come to the thirtieth part of a hair? Clearly, we must invent some new extravagance to represent such attenuation as this. Yet in this factory we find power machines cutting metals to this fineness, and gages to determine whether the work is well done! We have frequently prided ourselves upon the fineness of our editorial hair, and thought it rather delicate than otherwise; the reader can conceive of our dismay when we found, upon measuring one of them, the needle indicated 32 degrees of thickness, or about an inch and a quarter! From this illustration the reader can form a very good idea of the value and nicety in measurement of which these instruments are capable.

All of the many hundred machines which we inspected were made on the premises, and most of them can be—as indeed some of them are—patented. They are the net result of ten years of toil, thought and experiment, and they are certainly evidences of mechanical skill, on the part of their inventors, of which the company may well have reason to be

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proud. The machines are not retained in service any longer than they can be made to serve the very best use; so soon as experience demonstrates that some other expression of the principle employed will produce better results, they are deposed and make way for the latest inspiration of the inventors. This is the reason why the company is able to compete with the best watchmakers abroad. We have no reason to fear that the quality of our American watches will not continue to maintain the high reputation which they have already achieved, so long as this principle is enforced. The factory, as it now appears, with its extensive range of buildings and mechanics in them, has grown naturally from small beginnings, and obviously on the sure basis of the good quality of the work produced. We are told that the difficulties encountered in thus starting a business new to the country and on a plan wholly different from the methods of the old countries have been immense, but these have all been surmounted. In this—as in all undertakings of a similar kind—experience, that hard master, has been the only guide to progress, and the success of the company proves, not only that its difficult undertaking has been done with good business ability, but upon sound scientific and mechanical principles.

In our necessarily brief account we have been unable to give any thing more than an outline of the process of manufacturing watches by machinery. There are a thousand little methods and operations which, were it not for prolonging our article, to say nothing of disclosing secrets of the business, we should like to describe to our readers. We were specially interested in the making of chronometer balances, which involves operations of great delicacy. We particularly admired the tools by means of which the brass pieces in the finer watches are made and by which the holes for jewelled settings are drilled in the plates so as to insure the perfect identity of all watches of one class in the important matter of pitch and depthing of the train. Dial-making and gilding were highly interesting. The operation of teeth-cutting, both upon wheels and pinions, so as to insure a true epicycloidal curve in the shape of the tooth, whatever the size of the pinion or wheel, indicated a thorough acquaintance with high mechanics. But we cannot linger. We close with saying that, whether good watches are produced at this factory or not, it certainly possesses mechanical means of the highest order—means adequate, in our opinion, to produce the best.

VALUABLE RECEIPTS.

COLLODION FORMULÆ.—The following two receipts are from the *Photographic News*:—

"Those who are in the habit of experimenting in the preparation of collodion for photographs will, probably, like to try the following formula communicated by M. Jeanrenaud to the *Moniteur de la Photographie*. To counterbalance the drawback of complexity which seems to characterize it, is the strong recommendation of the author, who possesses a high reputation. It is stated to give delicate results, to be very rapid and durable, improving rather than deteriorating with age. Here is the formula:—Soluble cotton, 8 parts; pure ether, 800 parts; alcohol (sp. gr. 830), 250 parts; iodide of cadmium, 9 parts. Dissolve and add to 35 ounces of collodion 25 of pure bromine. To 3 ounces of the collodion then add 12 drops of strong liquid ammonia. A deposit is thrown down, which may be re-dissolved by adding a few drops of glacial acetic acid. The 3 ounces are then added to the remainder of 35 ounces, and the whole left to settle for a fortnight. If it retains a straw color, it is fit for use; if it be colorless, add a few drops of bromine.

"M. Jeanrenaud also gives a formula for dry collodion as follows:—Take ordinary collodion, and add to it 5 per cent. of a solution of ether, saturated with yellow amber; the sensitizing bath consists of from 7 to 8 per cent. of nitrate of silver, and 2 per cent. of glacial acetic acid; the plate is then washed in four or five waters. The development may be effected either by the ordinary bath of sulphate of iron, or with pyrogallic acid. When the plates are large, it is necessary to fix the film around the edges by means of some varnish, either with alcohol or chloroform. M. Jeanrenaud found plates so prepared as sensitive, after the lapse of a month, as when first fixed. The time required is about double that of the wet process, and for landscapes varies from three to seven minutes, according to the light and the season."

EXTRACTING GREASE FROM PAPER AND SILK.—To extract grease from paper, such as a printed engraving, place some dry pipe-clay in powder upon the spots on the paper, and cover this with two or three thicknesses of blotting paper, and lay a warm flat-iron upon the paper, and allow it to stand for half an hour, reheating and replacing it two or three times. The heat of the iron softens the grease, and the whiting then absorbs it. For removing grease spots from light-colored silk, substitute soap-stone dust for the whiting. Oil is very difficult to extract from paper or silk, and it generally leaves a yellow stain that cannot be removed.

COLORS FOR STAMPING MUSLIN FOR EMBROIDERY.—Lamp-black, mixed with a solution of gum arabic or starch, will make a very good composition for stamping white muslin for embroidery. Prussian blue, ground to powder and mixed with a little boiled starch, answers for stamping blue on white muslin. All colors used for stamping should be of such a nature that they will wash out easily with soap and water, hence those fast colors which are used to print on calicoes are unsuitable. For stamping on a black ground, such as a piece of black cloth or velvet, common pipe-clay, mixed with a little starch, makes a white stamping composition. Lamp-black, mixed with resin in a molten condition, then cooled and ground to powder, with a little water, makes a good black for stamping.

Manufacturing Items.

The Middlesex Mills, at Lowell, Mass., are engaged principally in the manufacture of shawls and ladies' cloths. All the machinery is running to its full capacity, giving employment to about 820 persons, of whom 450 are males and 370 are females.

The largest tax-payers in Berkshire county, Mass., are Arnold & Richardson, of Adams, $1,849; Blackinton & Son, of Adams, $1,357; Ingals, Tyler & Co., $1,214; L. Pomeroy's Sons, of Pittsfield, $1,212; Taconic Mills, Pittsfield, $1,391; Berkshire Woolen Company, Great Barrington $1,845.

The engine lately in use at the machine shop of Cole & Walker, in Norwich, Conn., having proved of insufficient power for their increased business, they recently purchased the large one (one hundred horse-power), formerly in use at Slater's Mills, in Jewett City. On Saturday night, 14th ult., a gang of workmen commenced taking down the old engine and putting up the new one. The work was pushed with such vigor on Saturday and Sunday nights that the new engine was in place and running within twenty-four hours after the removal of the old one was commenced. The old engine was but ten inches cylinder and three feet stroke, while the new one is fifteen inches cylinder and five feet stroke, and it was necessary to remove and replace a long line of shafting, so that this will certainly be conceded to be lively work.

Frederick Grinnell, Esq., has been elected Treasurer of the Corliss Steam Engine Company, of Providence, R. I. He entered the employ of the company two years since, as draughtsman, and his present responsible position is due solely to his merit, which this successful manufacturing company appreciate.

A Novel Military Equipment.

The London *Morning Advertiser* publishes an account of a wonderful invention in France, by which a foot soldier, in heavy marching order, is enabled to walk on the water without sinking. It consists of a pair of india-rubber boots and trowsers, all of one piece, which are filled with air a little below the waist, and heavily weighted at the feet. With these trowsers on, a detachment has frequently crossed the lake of Vincennes, where the water is about fifteen feet, firing their muskets and loading them as they went. The men sink about two feet, the water barely reaching the top of their thighs, and appear not to have any difficulty in keeping their balance and moving along. This is not at all wonderful. If a Yankee had invented a similar aquatic machine, there would have been a self-propelling apparatus attached to each foot, and a submarine battery under each arm. The thing is only half done.

Counterfeit Postal Currency.

In answer to numerous inquiries on the possibility of detecting the counterfeit from the genuine postal currency, we can inform our readers that there are no means of discriminating between them. The texture of the paper on which the notes are printed affords no criterion whatever, and the small monogram, *ABC*, on some denominations, is only a trade-mark of the American Bank-note Company; the absence of it is no proof of an illegitimate bill. Some of the notes were printed by the National Bank-note Company, and others by the firm previously referred to. The only way of detecting a fraudulent note is by the coarseness of its execution; this can only be done when the bill is new, and by a person who is a judge of such work. When the note is dirty and crumpled up, no one, not even an expert, can safely affirm as to the good character of any particular note. This is poor encouragement, but it is all we are able to give.

"Near Enough."

We have, by far too often, heard this phrase applied to the dimensions of machinery in course of construction, or in process of erection, and it strikes us as being unmechanical and unmeaning. Machinery is always, or should be, made to certain standard sizes, and to say that this crank-pin fits "near enough" to that "brass" is to be guilty of carelessness in execution, and recklessness in speech. Such fits as "near enough" express are generally made over with a file and chisel, at the expense of time and labor which ought to have been avoided. We have frequently been witness to hours of hard work expended in filing out a brass box to suit a shaft, which should have been bored out correctly at first, and never re-touched afterward. "Near enough" is a careless fellow, and delays more than he helps. Away with him!

MISCELLANEOUS SUMMARY.

STUDY OF CHEMISTRY—COMMENDABLE COURSE.—The Philadelphia *Ledger* states that the authorities of the Polytechnic College, Philadelphia, have decided to open their laboratory for instruction in practical chemistry in the afternoons. There are many persons, not regular students of the college, whose engagements do not permit them to devote the whole day to study, and who yet need to be familiar with the best methods of performing chemical experiments, in order to improve themselves in the line of their daily business. Not only the young physician, the apothecary and the mechanical dentist, but the photographer, the dyer, the electrotyper and others, depend upon chemistry for many of the improvements in their several vocations.

"WILL you give me them pennies now?" said a big newsboy to a little one, after giving him a severe thumping. "No, I won't," exclaimed the little one. "Then I'll give you another pounding." "Pound away! Me and Dr. Franklin agrees. Dr. Franklin says; 'Take care of the pence and the pounds will take care of themselves.'"

PATRIOTIC.—Archbishop Hughes, when called on by the assessor for his return of silver plate liable to tax under the United States revenue law, rendered twelve thousand and forty ounces, with the remark: "You need not exempt me forty ounces; the country requires all the tax."—*N. Y. Sun.*

[Who cannot afford to be patriotic, whose silver plate amounts to twelve thousand ounces?—EDS.

IMMORTALITY OF THOUGHT.—One great and kindling thought from a retired and obscure man may live when thrones are fallen and the memory of those who filled them is obliterated, and like an undying fire, that thought may illuminate and quicken all future generations.

THE Nashville *Union* says that rag-pickers are now following the army in great numbers, picking up every stray rag that is seen, which they bring in baskets to Nashville and send North to make into paper.

ACCORDING to the *Naval Register* (just issued) there are now 450 naval vessels connected with the service of the United States.

THERE is a man out West who labors under the delusion that "Hon." placed before a man's name stands for honest.

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FISH AND FISHERIES.

Disciples of the gentle art of fishing are not wanting among names famous to literature and art. Poets have whiled away the hours and caught inspiration while catching trout from the streams that rippled by them; the lounger, the philosopher, men of letters generally, have sung and written of the charming sensations experienced while following up this pastime, and have given it their unqualified approval. It follows, then, that where the wise and good find something to commend, other men may study and observe with beneficial results.

Johnson, indeed, declared that a fisherman was simply an absurdity—a fool at one end of the rod and a worm at the other; but the worthy and reverend doctor must have been but a poor hand at killing a trout, and hence his spleen. Men go about the world unheeded and unheeding, and close their eyes to the instructive lessons that teem on every side and that continually manifest themselves in the economy of nature. The teachings of the insect world, the renewal of vegetation, the reproduction of the animal forces of the world are alike passed over and forgotten. Nature creates nothing without having some specific end in view. Of all the elementary or organic forces on the globe there is not one which does not perform some office or fill some place by which the economy of its functions is preserved unimpaired or are renewed. So with animated nature. Each member of each family and each family of every division has its appointed place and duty in the reorganization of the wasted or too rapidly increasing parts of the earth. Insects, beasts, reptiles, fishes and birds are as necessary to our existence, in one sense or another, as light and air; and the fish, particularly, form no small portion of the annual revenues of certain countries.

The ocean swarms with countless "tribes" of fishes, some known and regularly classified in histories, others mere excrescences on the body politic, which appear and reappear at different times, to the great bewilderment of naturalists. Shoals of herring, of mackerel, of caplin, codfish, bonitas, whitefish and many other kinds are annually taken in great numbers, furnishing not only food to the nation, but employment to a large number of persons directly and indirectly. The scenes connected with the taking of these inhabitants of the deep are very interesting and have been described at great length by various writers. Codfish are not regarded as a special luxury by the community at large, yet so important was the revenue derived from the fisheries that, in the year 1721, the French built a huge fortress on Cape Breton, mounting two hundred guns, solely for the protection of the cod-fisheries of that place. This fortress was, however, subsequently captured by volunteer force from New England, headed by one William Pepperell. The French fisheries declined rapidly after that—so much so that out of 500 vessels that constituted their fishing fleet in 1745, only 100 remained in 1746. After the peace of 1815 the business prospered again till, in 1852, the cod-fishery alone employed 450 ships and 14,000 seamen.

The total value of the products of the sea fisheries of this country exported during the year ending June 30, 1858, was $3,550,295. Of this sum $2,865,847 were the product of the whale fisheries and $684,448 of the cod, herring and mackerel fisheries. Besides the sea fisheries, however, this country possesses an untold amount of wealth in the vast fresh-water lakes that stretch over the northern part of the country. From these inland seas an annual revenue is derived of about 45,000 barrels, principally white fish, worth nearly $500,000; and from the tributaries which flow into these great seas there are upwards of 10,000 barrels of pickerel taken annually, worth $85,000. The white fish are found in great numbers in the Detroit river and around the shallow waters at the head of Lake Erie, in Sandusky bay and at other points near by. They are taken with nets, and the salting and curing of them for market affords employment to a large number of persons. When first taken from the water, in the fall of the year, they are extremely delicious eating, but they become insipid after a few hours absence from the lake. The operations of the Sandusky bay fisheries are carried on near the wharves of that town; the offal is thrown overboard and it is said that the roe becomes impregnated by contact with the vitalizing principle of other fishes, and in the following spring myriads of young fish may be seen darting through the water. It may be interesting to our Northern readers to know that these fish belong to the family *chondropterygian;* they being so classified by Cuvier the great naturalist. The salmon trout are taken in great numbers at the straits of Mackinaw; they belong to the distinguished family of salmons, but have so little in common with that eminent and excellent fish, that an epicure would scarcely recognize the relationship. They are caught with hook and line, and are also speared by the Indians with "grains."

The cultivation of fish (pisciculture) is an art which has been introduced of late years and has been attended in foreign countries with good results. Efforts have been made to re-stock some of the exhausted streams in this country with salmon and other fish which were formerly abundant with them, with what success we cannot say. At one time the salmon were so plentiful in the Merrimac river that indentured apprentices stipulated that salmon should not be put upon the table oftener than twice a week. That breeding fish, artificially, is perfectly feasible has been fully demonstrated by Professor Buckland, of England. This gentleman recently fitted up a window in the office of the *Field* (a newspaper published in London), wherein a very simple apparatus is placed, in which any one interested may view the process by which nature brings forth the fish from the eggs or spawn. The professor says:—

The apparatus consists of a large earthenware tank, fitted with a stop-cock, from which a stream of the ordinary water-supply water runs without intermission day and night. The ova are placed in a zinc trough and rest upon glass rods. One side of this trough I have caused to be made of glass, in order that the spectators outside may see what is going on in the box. The stream of water (which is about swift enough just to move forward a small portion of paper thrown into it) having passed over the rows of the ova, finds its way out, by means of a stop-cock, into another trough (similar to that above it) in which I have placed well-washed common coarse gravel.

When I first received the eggs the eyes of the young fish were just visible as two small jet-black specks—the sign that they will bear transport; the oil globules could also be seen in the substance of the egg, and the tail of the fish could be observed moving from side to side with a rapid vibratory movement. The young fish have increased in size daily, and every morning their growth was plainly perceptible; more especially could be noticed the form of the head and the darkening of the transparent substance which would eventually be the body. I have already ascertained one fact, and this (as the question has frequently been put to me) I shall venture now to mention. The eggs do not grow, *i. e.*, they do not increase in circumference or in diameter, but the fish inside them most certainly increase in bulk till at last it becomes so large that the egg-shell suddenly bursts and out comes the young fish.

This morning the man whom I have put in charge came up to report to me that the fish were hatching. I immediately went down and found two of the salmon out of their shells and quietly reposing among the ova. Sprightly young rascals were these water-babies, not yet two hours old. The moment they saw the spoon with which I wanted to catch them coming near, off they cut with a rush and a dart like a full-grown fish using only their tails as a mode of progression. They have, moreover, a heavy weight to carry, for attached to their belly is a large bag, nearly the size of a lemon-pip, but more oblong in shape, which contains the nourishment which they must absorb into their systems before they are able to shift for themselves; the moment the contents of this bag are gone they at once begin to feed with the mouth like adult fishes. I removed the new-born fish immediately into the lower trough which contains gravel; in an instant away they wriggled under a stone, where they now repose in security.

The trout, as a game fish, are highly prized, and many ponds and preserves exist in this country, where they are well cared for and attain to a great size. Mr. Barnum has four large salmon trout in his museum, the largest of which weighs upwards of five pounds. At a recent meeting of the Farmer's Club (New York) Mr. Pell made the following remarks in reference to the trout:—

The trout is the only fish that comes in and goes out of season with the deer; he grows rapidly and dies after reaching his full growth. The females spawn in October, at a different time from all other fish; after which both male and female are lean, weak and unwholesome eating, and, if examined closely, will be found covered with a species of clove-shaped insects which appear to suck their substance from them, and they continue sick until warm weather, when they rub the insects off on the gravel and immediately grow strong. The female is the best for the table; she may be known by her small head and deep body. Fish are always in season when their heads are so small as to be disproportioned to the size of their body. The trout is less oily and rich than the salmon; the female is much brighter and more beautiful than the male; they swim rapidly and often leap, like the salmon, to a great hight when ascending streams. When I first stocked my trout pond I placed fifteen hundred in it, and was accustomed to feed them with angle-worms, rose bugs, crickets, grasshoppers, &c., which they attacked with great ferocity to the amusement of those looking on. They grow much more rapidly in ponds than in their native streams, from the fact that they are better fed and not compelled to exercise. Trout are the only fish (known to me) that possess a voice, which is perceived by pressing them, when they emit a murmuring sound and tremble all over.

Mythic and fabulous qualities have been attributed to fishes since time immemorial. The Grecian mythology abounds with such fancies; as, for example, that of Arion the musician. The sailors of the ship in which the inspired lyrist sailed conceived a plan to rob him of his treasure and then to cast him overboard. This they proceeded to do, but he, begging for a short armistice, royally attired his person and then struck up such tuneful harmonies that the dolphins thronged alongside to listen. When the melody was finished the musician threw himself headlong into the sea; but, instead of perishing, he was offered a "back" by one of the dolphins and borne safely to land. At the present day such an experiment would hardly be attended with such favorable results.

Certain fishes seem to exist for no other purpose than to guide and counsel those of greater ferocity but less cunning than they. Of these the pilot-fish is an example, and an anecdote illustrating its peculiar instincts is here appended:—

"In the month of May, 1797, the ship which bore the celebrated French zoologist, M. Geoffey, was lying becalmed between Cape Bon and the island of Malta, when the *ennui* of the passengers was dissipated by the approach of a shark. He was preceded by two pilot-fishes that had directed their course towards the ship's stern, which they inspected twice, swimming from one end to the other. Not finding anything, they for a time departed. The shark, it is asserted, never lost sight of the pilots, and he seems to have followed them as if he had been iron and they magnets. The sailors threw overboard a large hook baited with pork; the three fish observing the splash of the bait stopped. The two pilots advanced as if to examine the cause; while they were gone the shark was seen playing upon the surface of the level sea, now diving, now reappearing in the same place. When the pilots discovered the pork they swam swiftly back to the shark, took the lead and all three made towards the ship. The shark did not seem to discover the bait till it was pointed out to him by the pilots, he then made a rush at it and was hooked and hoisted on board. In this case the pilots seem to have led their friend to his death.

"The next witness, a captain in the royal navy, gives these 'leaders' credit for greater sagacity. Captain Richards, while on the Mediterranean station, saw following the ship a shark, attracted probably by a corpse which had been committed to the deep. A shark hook, baited with pork, was thrown out. The shark, attended by four pilot-fishes, repeatedly approached the bait; whenever he did so, one of the pilots was distinctly seen from the taffrail to run his snout against the shark's head as if to turn it away. After some further play the shark swam off in the wake of the ship, his dorsal fin being distinctly visible above water for a long time. When, however, he had gone a considerable distance, he made a sudden turn, darted after the ship, and, before the pilots could overtake him, snapped at the bait and was fast. On hoisting him up one of the pilots was observed clinging to his side until he was out of water then he fell off. All the pilot-fishes then swam about awhile, as if in search of their friend, with every appearance of anxiety and distress; but soon after darted suddenly down into the depths of the sea.

"Mr. Mayen deposes that he saw no less than three instances in which the shark was led by the pilot-fish. When the former neared the ship the pilot swam close to his snout or his pectoral fins. Sometimes the pilot-fish darted rapidly forward, sideways, as if looking for something, and constantly went back to the shark. When the latter was within twenty paces from the ship a piece of bacon fastened to a great hook was thrown over-board. Quick as lightning the pilot-fish darted up, smelt the bait and instantly went back to the shark, swimming many times around his snout, and splashing as if to give the exact information as to the bacon. The shark then put himself in motion, the pilot showing him the way, and in a moment the shark was hooked."

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FLOURISHING CONDITION OF THE NEW YORK MACHINE-SHOPS.

All of our large machine-shops are very busy at present in filling their several contracts. We have recently visited them and obtained a few particulars respecting the nature of their operations :—

THE NOVELTY IRON WORKS.

At these works we found a large number of engines in all stages of construction. In the middle of the new erecting shop stand the huge cylinders and bed-plates of the engines building for one of the Italian frigates now almost ready to launch from the shipyard of W. H. Webb, Esq. These engines have horizontal cylinders 84 inches in diameter and 45 inches stroke ; they are of the back-acting variety, have slide valves worked by a link motion and are strongly and handsomely finished. The propeller for these engines (both working on one shaft) is of brass and weighs nearly 30,000 pounds ; it is 19 feet in diameter and has a pitch of 31 feet 6 inches ; the greatest width of the blade is 6 feet 3 inches. These engines will have surface condensers and all the latest improvements for convenience of access. We shall review them more fully when they are completed. In addition to the above there are also two beam engines, one of 105 inches diameter of cylinder and 12 feet stroke, and the other of 100 inches in diameter and stroke of the same length. These engines have an automatic cut-off arranged by Mr. J. V. Holmes, superintending draughtsman of the works ; surface condensers are also supplied. Mr. W. Vanderbilt is the engineer in charge for the company.

There are also two pairs of horizontal screw engines, gunboat pattern, for the iron-clad *Miantonomoh*. The cylinders are 30 inches in diameter by 27 inches stroke. Two revenue-cutter engines are projected, with double cylinders, 36 inches in diameter by 30 inches stroke; the screws are geared to make three revolutions to one of the engine ; they are 8 feet in diameter and have an expanding pitch of 16 feet. The Novelty Works are also engaged in building machinery for a paper mill, located in the interior of this State. 900 men are employed at present.

THE MORGAN IRON WORKS.

This shop also is engaged upon a pair of engines for the other frigate for the Italian Government, building by Mr. Webb, and consort to the one first mentioned in this article. The engines are of the same dimensions in every respect and are are progressing towards completion as fast as hands can accomplish it. In addition, there are a pair of inclined engines, navy pattern, 58 inches diameter of cylinder and 8 feet 9 inches stroke. These engines are to be fitted to gunboats for our own Government. Marshall O. Roberts, Esq., has a beam engine in course of construction, whose cylinder will be 81 inches in diameter and 12 feet stroke. Mr. E. N. Dickerson's cut-off will be applied to it. A force of 750 men are at present engaged here.

THE ALLAIRE IRON WORKS.

This old-established foundry has quite a number of contracts on hand at present, which are rapidly going forward. Among them we may specify, primarily, the huge engines for the *Puritan*, the formidable iron-clad building for our Government. The two cylinders of these engines are to be 100 inches in diameter, and (we think) 4 feet 6 inches stroke ; they will be upright, and the pistons have trunks to which the link working the main rockshafts is affixed. The particulars of these engines were not furnished us. We have tried several times to obtain an insight into their details, but we have been informed in several shops that the plans were not matured. This is simply incredible, as no engine can be built "piecemeal" with good results. No good end is subserved by such rigid secrecy in regard to the several parts. It is proper to say, however, that every attention was afforded us by the officials at the shops we visited, and the blame must rest on the officers at Washington, who reserve information which belongs to the people.

There is also a large beam engine building at the Allaire Works, whose cylinder is 81 inches in diameter by 12 feet stroke, for the New York and New Orleans Steamship Company. The wheels are 33 feet in diameter, 10 feet 6 inches face, and have 18 inches depth of bucket. A similar engine is also building for a companion vessel ; they will be called, respectively, the *Morning Star* and *Evening Star*, and are, viewed externally, very handsome specimens of marine architecture. The engine of the old steamer *New World* is being removed and put up in the *Dictator*, a splendid new river-boat shortly to be launched by John Englis.

In addition there are two inclined engines, of the navy pattern, having cylinders 58 inches in diameter by 8 feet 9 inches stroke, driving overhung side-wheels. The wheels are 24 feet in diameter and 10 feet face. One engine, 52-inch cylinder, having 10 feet stroke, is building for the steamer *City of New London*. One engine, 56-inch cylinder and 12 feet stroke, for Captain Sands, and one 50-inch cylinder by 12 feet stroke, for Oliphant & Sons ; also, one 81-inch cylinder, 12 feet stroke, for Commodore Vanderbilt. There are 850 men at work on these contracts.

THE UNDERHILL IRON WORKS.

J. S. Underhill & Co. have about 160 men at work at various contracts. This shop, it is said, is under the jurisdiction of the Allaire Works.

THE ETNA IRON WORKS.

The name of these works will not be recognized by those persons unfamiliar with the changes continually occurring in the trade. The shops are in Goerck street, on the site of those formerly occupied by Mr. Roach, but the buildings have been much improved and enlarged. The engines of the *Dunderberg*—the immense ram (building by Mr. Webb) of which we gave an account on page 162, current volume of the SCIENTIFIC AMERICAN—are here in course of construction, as is also an oscillating cylinder engine of 66 inches diameter of cylinder and 10 feet stroke; this is a low pressure engine having its air-pump worked by an auxiliary engine. This feature is a very objectionable one, as has been proved by experience. There are also two inclined engines of the navy pattern, having cylinders 58 inches in diameter by 8 feet 9 inches stroke.

One hundred and twenty men are employed at present, but the works are hardly ready for active operation, and this figure is only a small part of the working force required.

THE BADGER IRON WORKS.

The Badger Iron Works are now busily engaged on a Government contract for shot and shell. We saw a large number of the heavy 15-inch shot in various stages of progress. The number of men employed was not stated.

THE DELAMATER IRON WORKS.

The Delamater Iron Works are also actively engaged on different engines. A full account of the extent of their operations was given a few weeks since. The *Dictator*, an iron-clad ram and consort to the *Puritan* at Greenpoint, is building at the Delamater Works. All of the shops are very busy, and the trade promises to be active for many weeks to come. Should we make successful progress towards crushing the rebel force now in arms against the Government, we think good results will be immediately seen in our machine-shops. A large number of vessels, now in the employ of the Government, will have to be overhauled and other ones built to supply their places in the trading lines from which they have been recruited.

About 7,500 men are now employed in the machine-shops about the city and its suburbs.

Climates and Cold at High Elevations.

The temperature declines rapidly as we ascend the atmosphere. Places among mountains always possess a climate more severe as they are higher above the level of the sea. Even under the equator the hight of position so modifies the season, that, at an elevation of 13,000 feet, the mean temperature is about that of Quebec.

The cold which prevails among lofty mountains is ascribed to the dilatation which the air of lower regions experiences in its upper ascent, to a more rapid evaporation under diminished pressure, and to the intensity of nocturnal radiation. Places which are situated upon the same mountain-chain, nearly in the same latitude, and at the same hight, have often very different climates. The temperature which would be proper to a place perfectly isolated is necessarily modified by a considerable number of circumstances. Thus, the radiation of heated plains of considerable extent, the nature of the color of the rocks, the thickness of the forests, the moistness or dryness of the soil, the vicinity of glaciers, the prevalence of particular winds, the accumulation of clouds, &c., are so many causes which tend to modify the meteorological conditions of a country, whatever be its mere geographical position. The neighborhood of volcanoes in a state of activity does not appear to affect the temperature sensibly.

From the whole series of observations which J. B. Boussingalt, a Frenchman, made on the Cordilleras, it appears that 1° of temperature corresponds to 649.4 feet of ascent among the equatorial Andes. In Europe, it has been ascertained that the decrease of temperature in ascending mountains is more rapid during the day than during the night—during summer than during winter. In no part of the globe is the diminution of temperature occasioned by a rise above the level of the sea more remarkable than among equatorial mountain ranges. M. de Humboldt says that "upon each particular rock of the rapid slope of the Cordilleras, in the series of climates superimposed in stages, we find inscribed the laws of the decrease of caloric, and of the geographical distribution of vegetable forms."

In the hottest countries of the earth the summits of very lofty mountains are constantly covered with snow. In the elevated and cold strata of the atmosphere, the watery vapor is condensed, and falls in the state of hail and snow. In the plain, hail melts almost immediately ; the fusion is slower than on the mountains, and for each latitude there is a certain elevation where hail and snow no longer melt perceptibly. This elevation is called the "inferior limit of perpetual snow."

The accidental causes which tend to modify the temperature of a climate also act in raising or lowering the snow line. On the southern slope of the Himalayas the snow line does not descend so low as it does upon the northern slope. Elevation above the sea has the same effect upon climate as increase of latitude. Upon mountain ranges vegetation undergoes modification in its forms, becomes decrepid, and disappears toward the line of perpetual snow, precisely as it does within the polar circle, and for no other than the same reason, viz.: depression of temperature.

In considering the extent of vegetation toward the polar regions, plants are discovered in places which have a mean temperature much below that which is the limit of vegetable life on the mountains of equatorial regions. In those rigorous climates vegetation is suspended by the severity of the cold during the greater part of the year. It is only during the brief and passing heat of summer that the vegetable world wakes from its long winter sleep. Nova Zembla (lat. 73° N.), the mean temperature of whose summer is between 34° and 35° Fah., is, perhaps, like the perpetual snow line of the equator, the term of vegetable existence. It is also due to the very remarkable heat of the summer, in countries situated at the northern extremity of the continent of Asia, that man succeeds in rearing a few culinary vegetables. At Jakoustk (in 62° of N. lat., where mercury is frozen during two months of the year), the mean temperature of summer is very nearly 64° ; wheat and rye sometimes yield a return of 15 for 1, although at the depth of a yard the soil which grows them is constantly frozen.

The limit of perpetual snow being much lower upon the mountains of Europe than in tropical countries, agriculture ceases at a much less elevation. At a hight of 6,560 feet above the level of the sea, the vegetables of the plain have almost entirely disappeared. In Northern Switzerland, the vine does not grow at an elevation of more than 1,800 feet above the sea line. Maize scarcely ripens at an elevation of 2,850 feet ; whilst in the Andes it still affords abundant harvests at an elevation of 8,260 feet. On the plateau or table land of Los Pastos (South America) fields of barley are seen at upwards of 10,000 feet above the level of the sea ; but on the northern slope of Monte Rosa, in Switzerland, barley fails to grow at an elevation of about 4,260 feet.

PASS through a crowd of boys busy with fire-crackers, and you will see how much more fond each lad is of his own particular noise than that of his companions. The same thing may be observed among public speakers and private talkers.

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Correspondence

Curious Statistics.

Messrs. Editors :—The readers of the Scientific American have no doubt heard that the game of chess was invented by an Indian, who stipulated with his prince that, as a reward for his ingenuity, he should receive one grain of wheat for the first square on the chess-board, two grains for the second square, four for the third, and so on, doubling in succession for each square up to the sixty-fourth. The prince (so the story goes), delighted with the modesty of his request, ordered his treasurer to pay the stipulated reward at once; but on calculating, it was found to require more wheat than the prince's dominion contained. Now although most persons who know any thing of the powers of numbers would assent to the general truth of this conclusion, few, who have not actually made the calculation, can form any adequate conception of the amount which would be required to satisfy such a demand. I have amused myself by making some calculations which may aid others in forming a conception of the amount, and they will, I think, surprise some of your readers. First, the required number of grains of wheat was 18,446,744,073,709,551,615 grains. This, reduced to bushels, at the rate of 560,000 grains to the bushel, makes 32,940,614,417,338 bushels, which would form a square pyramidal pile 4 miles high and $14\frac{45}{100}$ ths miles square at the base, and would allow more than five and a half bushels per annum to every man, woman and child that has existed since the creation; even supposing the number of inhabitants in the world to have been always as great from the time of Adam to the present day, say 1,000 millions.

If paid for in American gold coin, at the price of $1 per bushel, it would require 54,200,755 tuns 17 cwt. 1 qr., 6 lbs. of gold; and in gold dollars (old form) in piles of $20 each, placed side by side, it would cover a space of $70,092\frac{6}{10}$ths or $109\frac{1}{2}$ square miles; and if the coin was melted down into solid rectangular ingots, it would form a wall of solid gold, one foot thick, ten feet high and $1,905\frac{5}{8}$ miles long; or it would pave an area of $2,309\frac{7}{8}$ acres with solid gold, one foot thick.

The following data are taken for the calculation, which I mention in case any one wishes to test the correctness of my assertions :—The weight of one pennyweight was originally ordered to be the weight of 32 grains of wheat taken from the middle of the ear, well dried. I assume, therefore, that 32 grains of wheat weigh 1 pennyweight, which gives for a bushel of 60 pounds, 560,000 grains. In calculating the weight of one cubic foot of gold I take the specific gravity of gold at 19.362, and the weight of one cubic foot of water 62.32 lbs. avoirdupois. The bushel is $2,150\frac{42}{100}$ cubic inches, and the bushel consequently is to the cubic foot as 112 is to 90. The diameter of the gold dollar is $\frac{31}{60}$ths of an inch.

Euclid.

Harbor Defense—Floating Forts.

Messrs. Editors :—I propose, for harbor defense, to build an enclosure, either round or square, of say 75 feet inside diameter, formed of solid timber 12 to 15 feet deep, and from 18 to 20 feet wide, bolted solidly into one mass, then planked and coppered. I would have a frame-work built across the bottom of the enclosed space, sufficiently strong to hold firmly a center shaft, on which I propose to build a heavy hollow round vessel (of iron or wood) to support an iron round casemate solidly fastened to the round vessel. This structure should just float above the bottom frame-work, and be held in its place by the center pivot, which is to project up into the vessel through a stuffing-box. By placing proper cog wheels on and around the shaft, and the use of steam or hand power, the vessel and casemate may be turned in any direction, having only the friction of the water to overcome. The outside solid mass of timber will prevent the fort from being run into, and the water space between the outside timber and the round casemate will form a moat to prevent boarding. Further details need not be given at this time. A number of these forts could be built ready for use, at no great expense, and anchored in the channels where required.

W. H. Wood,
Civil and Marine Engineer.

Hudson City, N. J., March 24, 1863.

The Destiny of the Planetary System.

Messrs. Editors :—The ultimate destiny of the earth and all the planets and suns in the stellar universe is a subject of much interest and study to me, and I read with much pleasure those articles in the Scientific American relating to such topics. That our planets will ultimately rest upon *our* sun's surface and in his atmosphere I most firmly believe; also that they will in a great measure be vaporized as soon as they strike the sun, for the planetary motion will be much increased as they approach the central luminary. Just as the planets will approach that center when they have served their purpose in this system, even so will *all* the suns, when they become cold bodies and go through all the geological changes of our planet. They will roll on nearer and nearer to the great center from which they derive their light and heat until they have fulfilled their mission, when, one after another, they will drop into the bosom of their great primary, increasing his heat and light until the last star in the "milky way" shall bring to the Father all the created intelligences on its surface, with those of the sun and the planetary world. The heavens and earth shall pass away, and there will be a new heavens and a new earth—the sun's atmosphere and the sun itself. The final home for all created intelligences is the great central sun of the universe. This is my belief, and it accords with the most recent discoveries in science, so far as it relates to the spiral motion of the planets—increasing in their course towards the sun.

G. N.

Meadville, Pa., March 31, 1863.

Germinating Seeds under Blue Glass.

Messrs. Editors :—I lately visited the fruit nurseries at King's Ferry, N. Y., where I noticed a piece of blue glass placed over a flower-pot. Upon inquiry as to the reason of this, a lady pomologist—Miss Sarah Jacobs—stated that in most cases seeds placed under blue glass would germinate in about one-third of the time required without glass; and I have since perused the following statement as to the cause of this phenomenon, written by R. Hunt, Secretary of the Royal Polytechnic Society, England :—"It is scarcely necessary to explain that every beam of light proceeding from its solar source is a bundle of different-colored rays, to the absorption or reflection of which we owe all that infinite diversity of color which is one of the greatest charms of creation. These rays have been long known to possess different functions. The light which permeates colored glass partakes to some considerable extent of the character of the ray which corresponds with the glass in color; thus, blue glass admits the chemical rays, to the exclusion, or nearly so, of all the others; yellow glass admits only the permeation of the luminous rays, while red glass cuts off all but the heating rays, which pass it freely. This affords us a very easy method of growing plants under the influence of any particular light which may be desired. The fact to which I would particularly call attention is, that the yellow and red rays are destructive to germination, whereas, under the influence of violet, indigo, or blue light, the process is quickened in a most extraordinary manner. The plants will grow most luxuriantly beneath glass of a *blue* character, but beneath the yellow and red glasses the natural process is entirely checked. Indeed, it will be found that at any period during the early life of a plant, its growth may be checked by exposing it to the action of red or yellow light. It is with much satisfaction that I find the results to which I have arrived, corroborated by Dr. F. R. Homer, of Hull." Blue glass for hot-beds could be very conveniently employed. The chemical violet is probably the right color for the best results. A cheap glass for green-house and hot-bed purposes could be made by coloring common glass with manganese and cobalt. This information may be very useful in the raising of rare exotics, and for developing plants in the early stages of their growth.

H. Holden.

East Genoa, N. Y., March 31, 1863.

Amalgamating Battery Plates.

Messrs. Editors.—I have found the following to be a simple and inexpensive method of amalgamating the zinc plates of galvanic batteries :—Make a solution of 200 drachms of quicksilver in 1,000 drachms of warm aqua-regia (1 part of nitric to 3 parts of muriatic acid). When all the quicksilver is dissolved, add 1,000 drachms of muriatic acid. When this solution is cold it will effectually amalgamate a great number of plates by simply immersing them in it for a few seconds, no matter how badly they may be corroded.

H. C. B.

Cincinnati, Ohio, March 30, 1863.

The New Ferris Gun.

The Utica (N. Y.) *Herald* says :—"A series of test shots have just been made with the new cannon invented by Geo. H. Ferris, of this city. The object was to test the range of the cannon, and Oneida Lake was chosen as a convenient locality for the purpose. The result is wonderful, and goes far to establish all that has been claimed for the invention. It is fully believed that the range of the gun has been proved to be much greater than has ever before been attained by artillery.

"The recent experiments may be thus briefly stated :—When the muzzle of the gun was carefully placed on an exact level with the ice, and four feet six inches above the surface, the ball first struck the ice at a distance of one thousand feet, and ricocheting, was found at a distance of three and a half miles. When the gun was placed at an elevation of a trifle over one-half of one degree, the ball first fell to the surface at a distance of twenty-six hundred and forty feet. A series of shots were fired at elevations up to nearly eight degrees, and at that elevation the ball first fell to the ground at a distance of two miles. It was found impossible to trace the ball when fired at higher elevations.

"But these experiments are deemed sufficient to establish the vast superiority of the gun. In the most successful experiments with the celebrated Whitworth gun, the highest rate of initial velocity attained was seventeen hundred feet per second. The Ferris gun in these test shots has demonstrated an initial velocity fully double. The achievement is startling, and must revolutionize artillery science. We are assured that the measurements were all carefully made, and remarkable as the results are, they seem to be established as matters of fact."

Use of Coca Leaves.

"An English merchant, Mr. Campbell, a resident of Tacna (Bolivia), in whose company I returned from Lima to Europe, told me that some years ago he was obliged by urgent business to travel in one day's journey a distance of about 90 miles on a mule, and that he was accompanied the whole distance by an Aymara Indian on foot, who continually kept pace with him, without taking any other nourishment than a few roasted grains of maize and some coca leaves (*Erythroxylon coca*), which he kept chewing, mixed with a small quantity of quick-lime. Arrived at the night station, Mr. Campbell, though his mule was an excellent animal, felt considerably fatigued; his guide, on the contrary, after standing on his head for a few minutes—a very remarkable custom of the Aymara Indians, probably for the purpose of counteracting the strong downward congestion of the blood—and swallowing a glass of whiskey, resumed, without any rest whatever, his homeward journey."
—*Dr. Scherzer's Reise der Novara.*

"Whistling Dick Rodman."—This is the name given by our soldiers to a gun which the rebels have in their batteries just below Vicksburg, distinguishable from all other Confederate weapons of defense by the noise with which it announces its presence and mission. It throws a solid shot, about eight inches long and three inches in diameter, shaped somewhat like an auger, and intended, we believe, to pierce iron-clad vessels. In passing through the air the ball makes a tremendous whiz, as if all the imps in the lower regions were practicing phonetics on the final letter of the alphabet. We have not yet had an opportunity of witnessing its effects upon any of our gunboats, though the rebels have made several attempts with it, as upon the *Indianola* and *Queen of the West*. The gun is "trained" toward the mouth of the canal, and will be heard from in due time.

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Artificial Manures.

The following useful remarks on artificial manures are condensed from the *Irish Country Gentleman*:—

As to the principles which should guide us in the selection of artificial manures, Mr. Drew observes that we should endeavor to procure (bearing in mind the crop to be raised) those having the closest resemblance to farm-yard manure in their fertilizing properties. He adds:—"First in order of the artificials I will take guano. Guano, or *huanu*, in the language of the Incas, means dung or manure. The price paid for the first imports of Peruvian, was from £25 to £27 per tun. In four years afterward it was down to £10 per tun; since which time it has varied between that and £15, the wholesale price of the agents of the Peruvian Government now being £12 ($60). There are several other kinds, some of which are of a useful description, varying in price from £4 to £11 per tun. Peruvian is the best, and almost always of a uniform character.

"There are few who have not witnessed the good effects that this manure has on vegetation. Theorists and consumers all agree that, for general purposes, hardly any other manure can compete with it, and all efforts to find one of equal reputation at less cost has not succeeded. It is considered by chemists to belong to the nitrogenous class of manures, rich in ammonia, at the same time containing a good proportion of phosphates.

"Nitrate of soda is considered more as a stimulant than a manure, and is better calculated (combined with salt) as a top-dressing at spring for corn crops and the grasses than for roots; if pure it should consist of 94 or 95 per cent. of chemically pure nitrate; and contains much the same amount of ammonia as guano, but in rather a different state. It does not lose its virtues in dry hot weather; on the other hand, if an excess of rain occurs, there is a probability of a portion being washed away. It has, however, generally, extraordinary powers of invigoration, producing most marked effect on vegetation."

Of those which are considered more immediately as root-fertilizers, such as bones, superphosphate and special manures, Mr. Drew observes:—"Bones have been longest used, but are now to a great extent superseded by the others. Bones in their natural state contain a large proportion of phosphate, with a good deal of gelatine and fat, and about five per cent. of ammonia. The presence of grease prevents their rapid decomposition, and accounts for their tardy action. After being subjected to boiling or steaming they act more readily, and after burning they are more soluble still, showing that their manuring properties are chiefly derived from the phosphates. Chemists now tell us it is a waste of money to apply them in their natural state, and that they never should be used without first subjecting them to the action of acid. Superphosphate, next to guano, undoubtedly is the most important and the most extensively used artificial manure. The sources from which it is derived are bones, bone-ash, animal charcoal, the inferior varieties of guano, coprolites, and mineral phosphates; a good deal of variation no doubt exists in the qualities of this manure.

"As to the relative value of the different artificial manures, this is a question easier asked than answered, being one depending on a number of contingent circumstances. First of all, there is the requirements of the crops, the nature and condition of the land, the available food already naturally existing in the soil, the state of the weather and time and mode of application, with various others. Different plants possess different habits and wants, whilst the soils may be deficient in those very substances which are essential to their development; when this is the case, those manures must be resorted to which (from previous experience) the farmer thinks most calculated to supply the necessary ingredients, in the best available form, and from the best and cheapest source; attention being paid, not to the immediate cost of the article, but to the requirements of the particular crop to which it is to be applied. Generally speaking, the money value of a manure depends in a measure on the amount of ammonia and phosphates it contains. But this 'great point' is one which every farmer must determine for himself. The experience of others is, indeed, suggestive on this head, and in the hands of a man of judgment may be turned to good account; but every farm has its own peculiarities, and no general rule can be laid down for our guidance in determining, qualitatively, the exact constitution of the manure that would suit best, or quantitatively the precise amount of manure which may be most profitably applied. These are matters for individual experience and judgment."

The Effects of Common Salt and Coffee on the Human System.

The following interesting remarks are from the *British and Foreign Medicql and Surgical Journal*:—

"Culinary salt, according to the researches of C. Voit, is a powerful stimulator of the metamorphosis of tissue; it increases, by means of its physical properties, the capillary circulation of fluids in the organism; it increases the oxidation of albumen and through this the quantity of urea excreted. Culinary salt is also a true diuretic. In order to excrete the salt from the body, water is required; this water passes always through the kidneys (the only channel for the excretion of culinary salt in the dog), and is, if the supply of water from without is limited, abstracted from the tissues.

"Voit's experiments with coffee on a dog led to the inference that coffee does not, as is usually assumed, diminish the metamorphosis of nitrogenous tissue and the excretion of urea, but, on the contrary, rather increases those processes. On the whole, the dog appeared to be more lively after the use of coffee. The author made also experiments with *caffein* on frogs, and found it to cause, at first, increased irritability of the nervous system, a tendency to reflex-movements and to tetanic convulsions; later, however, phenomena of paralysis. The pupil becomes dilated; the capillary vessels are filled with blood; the heart's contractions are at first increased, later reduced in frequency, they are arrested during the tetanic paroxysms. The author attributes the principal effects of coffee to its action on the nervous system, not to its influence on the tissue-change. The nervous system being rendered more susceptible, the same exciting cause produces a greater effect. Coffee thus refreshes (Voit thinks) the fatigued body, renders the lassitude less perceptible, and in this manner enables us to endure prolonged exertion. The experiments on the influence of bodily exercise (tread-wheel) on the tissue-change in the well-known dog, led to the unexpected result that the excretion of urea was not at all, or only very slightly, increased by bodily labor. Voit infers, therefore, that muscular action does not cause increased decomposition of albuminous substances, while it is accompanied with a greater consumption of fat. As the decomposition of albumen is not the source of the production of force, connected with muscular contraction, Voit is inclined to look for it in the development of electricity."

Network for blocking Narrow Channels.

A novel and apparently effective system for protecting the narrow channels of ports by a system of network is proposed by C. W. Eddy in the London *Shipping and Mercantile Gazette*, as follows:—

"For blocking narrow channels, I propose the construction of a system of network, consisting of two vertical and one horizontal nets of rope, the latter being of coir, a substance which offers these advantages:—First, of such lightness that it floats on the surface; second, of yielding and stretching before breaking; a quality which would enable it the better to resist the strain of a vessel charging it, because it would take the impact so gradually as to destroy her momentum, whilst itself stretching and being dragged through the water; third, cheapness. Manilla rope might, perhaps, be found to answer the purpose as well, but I believe that the greater buoyancy of coir would give it the advantage; buoyancy being essential to my plan, which is that the net should float horizontally. I propose that this net should be 50 fathoms wide, and of such length as to leave only a narrow channel at each end for the passage of vessels, thus bringing any hostile vessel immediately under the fire of forts, which, if sufficiently elevated, might fire through her decks and bottom. The net lying thus horizontally would be secured by the outer and inner edges to buoys, placed 50 fathoms in front of the outer edge, and 25 or 50 fathoms in rear of the inner edge, in the manner shown in the plan. In addition to this barrier, I propose that the buoys in front, and also those behind, should be connected together by a net of tarred hemp rope, four or five fathoms deep, hanging vertically in front of the buoys, to which they would be strongly secured. I maintain that this kind of barrier would be more effective than any rigid boom; it would be far less expensive in first cost and in maintenance, could be placed and removed with ease, and be available in many situations, such as at Spithead, in which a rigid boom would be out of the question. I apprehend that a screw ship would hesitate to charge a net of this description, flanked by heavy batteries, and if she did charge it, that it would either yield, destroy her momentum, and bring her up, just as a fisherman's net of twine is known frequently to entangle and take the largest porpoises; or, if she broke through, it would infallibly choke her screw (as a tunny net in the Mediterranean frequently does) and leave her at the mercy of an active enemy."

Purification of Coke.

In the operation of smelting iron with bituminous coal, the latter is first baked and reduced to coke before it is used. As it generally contains sulphur, this tends to injure the quality of the iron produced, and to remove this defect has been a great desideratum. M. E. Kopp (*Repertoire de Chimie pur et appliquée*) states that when the coke is at a red heat in the oven, if it be sprinkled with very dilute muriatic acid, nearly all the sulphur in it will be expelled, and the entire moisture also driven off by the heat in the coke. He also further states that if the coke so treated was afterward washed with water and then dried, all the phosphates in it and nearly all the other impurities would be removed, and a coke nearly as pure as charcoal obtained. This process may be effectual for the purpose, but it appears to be too troublesome and expensive for common application. A current of steam passed through the oven, when the coke is red hot, carries off most of the sulphur. Salt, mixed with the coal before being put into the oven, is employed for the same purpose.

Water-glass in Soap.

In the last number of *Silliman's Journal*, Mr. J. M. Ordway, who has devoted much attention to the composition and application of alkaline silicates, states that a mild silicate (water-glass) is now manufactured in Boston and New York, and has come into very general use among soap-makers. It is used as a substitute for resin, which had been largely employed in the manufacture of soap before the blockade of the Southern ports. It materially reduces the cost of soap, and imparts neither color nor smell to it. About sixty per cent of the fluid silicate, it is stated, may be mixed with the common materials that are employed for making bar soap. Mr. Ordway says:—"It is certainly quite safe to incorporate twenty-five or thirty pounds of liquid water-glass with one hundred pounds of pure oleostearate of soda. The compound thus produced has greater detersive power than common soap."

Aluminum Bronze.

Experiments have been made at the Royal Gun Factory, Woolwich, England, by Mr. J Anderson, to test the comparative strength, &c., of aluminum bronze. Its average breaking tensile strength was found to be 73.185 lbs per square inch, while that of common gun metal is but 35.040 lbs. Its composition is 90 per cent of copper, 10 per cent of aluminum. The purest copper that can be obtained, such as that of Lake Superior, is the best to employ. It requires to be remelted three times before it becomes fit for practical purposes. The specific gravity of this alloy is said to be about that of cast iron. It is far more rigid than brass or common gun metal. It produces good castings; it can be drawn into tubes, rolled into sheets, and hammered like iron, and it is also capable of being soldered with brass.

THE BEST KIND OF FLAX SEED.—At a late meeting of the Munster (Ireland) Flax Improvement Society, a large cultivator of flax stated that the best seed to use was that of Riga, in Russia. Dutch seed was very good, but the American was very inferior, and sold for fifty per cent. less than Riga. More than one-half of the flax grown from American seed goes into tow when scutched, while three-fourths of that obtained from Riga seed was good long flax.

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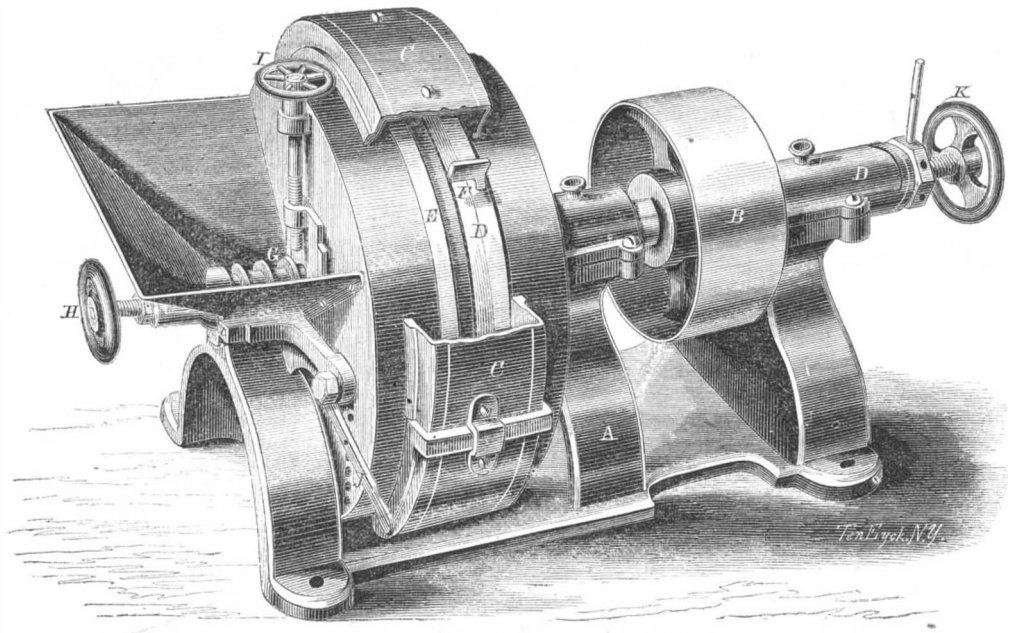
Improved Portable Mill.

Herewith we illustrate a very complete and efficient apparatus for making hominy, corn-meal and family flour; in fact, doing all kinds of grist-mill work on a small scale. Such a mill is an extremely useful machine in unsettled parts of the great West, or in any new country where the arts and sciences are backward. The mills are driven by either horse or water power, and their usefulness will be apparent to every intelligent person. The frame and bedplate, A, of this mill are cast entire in one piece; the shaft works horizontal, and as does also the driving pulley, B. The outer curb, C, or hood, is made of cast-iron and surrounds the mill-stones; the upper half of it is readily removed, but shown in our engraving as partly cut away to reveal the mill-stones; these are flat and made from French burr, or other proper material, and dressed as in ordinary mills. These stones are embedded in cast-iron boxes. The running stone, D, is on the end of the driving shaft, and the bed stone, E, is secured to the frame-work. The fan, F, is attached to the runner and serves to prevent the meal from collecting in the space within the hood; it also produces a circulation of air and cools the ground material, which is delivered through a hole in the bedplate under the stones. An adjustable and removable feeding screw is shown at G; its office being to force the grain through the eye of the bed stone. One end of this screw works in a recess in the end of the driving shaft with which it rotates, and the other end takes against the adjusting screw, H, and bears in a recess in the frame-work. The adjusting screw, I, regulates the feed to the mill by a vertical sliding gate, directly beneath which the thread of the screw is cut away; and J shows a lever which works a corresponding gate on the lower side of the same. The screw, K, taking (through the medium of a frictionless bearing) against the end of the driving shaft, regulates the running stone and ground material.

These mills are simple in construction and most efficient in use, requiring no previous skill to work, or to keep them in good order. They grind corn or other grain with equal facility, and of unsurpassed quality. They are made in sizes of 9-inch, 12-inch, 15-inch, and 18-inch diameters of stones, and grind from three to twelve bushels per hour. Further information can be had by addressing A. M. Hyde, assignee of the patent, at Newark, N. J.



SEARFOSS'S PATENT PORTABLE MILL.

Combined Capstan and Cargo-winch.

The capstan here illustrated is one of those universal machines which have a wide range of usefulness. It can be employed either as an ordinary capstan for tripping the anchor, warping ship and other duties for which these machines are generally used, and by means of the winch applied on one side, it can be made to aid materially in loading and unloading the cargoes. The capstan, A, has a vertical shaft secured internally to the base, B, about which it is revolved by the application of power to bars shipped in the holes in the head. There is also a pawl and a series of cells so disposed that the barrel is prevented from reacting when the leverage of the bars is removed or relaxed. The greatest peculiarity, however, consists in the arrangement of the hoisting gear. This is fitted in the case, C. There are two shafts, D and E, running in bearings in this case, which have the pinion and spur wheels, seen through the broken-out portion, keyed on them. These wheels are revolved by the crank, F. There are two winch heads, G, on either end of these shafts, which can be used for all purposes where such appliances are generally employed. The small round-headed bolt seen on one side of the case is an arrangement for throwing a pawl in and out of connection with the large spur-wheel. Fig. 2, is a representation of the capstan with the combination or cargo-winch attached. It consists merely of a light iron frame, securely fastened to the deck of the ship. The shafts, *a a*, are connected with the squared ends of the geared axles by the couplings, *b*, and the barrel or drum, *c*, on which the rope is wound, is worked through the cranks before mentioned. The grooved wheel, *d*, at the right, contains a friction-strap which is worked by a lever or rope, as desirable, and controls the speed of hoisting or lowering. These details comprise the invention.

Fig. 1

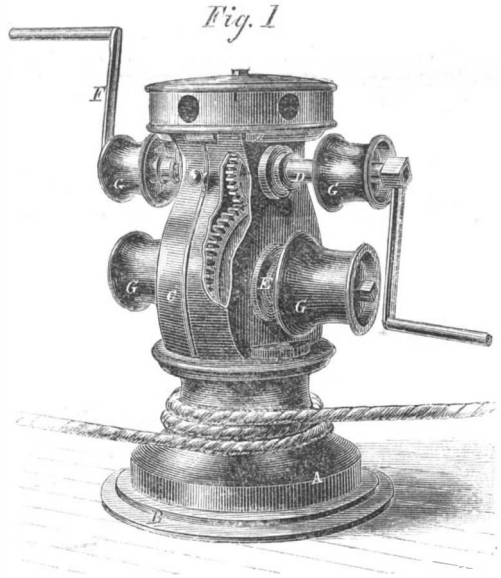
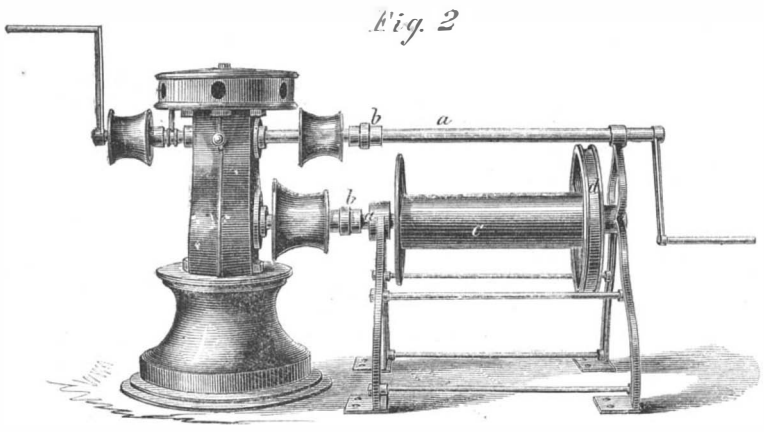


Fig. 2



GETCHELL'S PATENT CAPSTAN.

The whole affair is not at all cumbrous or unsightly, and no prejudices should attach to the use of it. It is an innovation on the old-style capstan, and a desirable one, as it adds materially to the effectiveness of the machine. Vessels with small crews should always be provided with such an apparatus, as it saves much labor. These capstans can be used on pier-heads or wharves and in any places where power of the kind is in request. The frame can be quickly removed when it is necessary to employ the capstan alone; and as the crank handles unship when the handspikes are inserted, no valuable space is occupied by them. This capstan was patented, through the Scientific American Patent Agency, on May 14, 1861, by John S. Getchell, of Machias, Maine; and further information may be had by addressing Getchell & Sargent, as above.

A Novel Letter-carrier.—A curious project has been set on foot for the speedy conveyance of letters between England and France. It is proposed to erect in both countries, at a distance of about 1,000 metres from the coasts of Calais and Dover, a strong edifice of masonry, containing a steam engine of sufficient power, by means of which an immense wheel, 25 metres in diameter, is made to turn forty times a minute. By this rotation a series of wires, forming a gigantic strap, extending across the channel, is coiled round the wheel at one end, say at Dover, and uncoiled at the other, Calais, and conversely. To this strap india-rubber leather bags are to be attached, which are thus conveyed across the channel at 3,000 metres per minute, so that, within the space of twelve minutes the letters and despatches from one country may be landed in the other.

Shall We have Wrought or Cast-iron Ordnance?

The Ordnance Bureau at Washington, desirous of ascertaining the value of wrought iron for artillery, over that made solely from cast iron, or the same material strengthened with forged bands, have advertised in the Scientific American for proposals from manufacturers of wrought iron, with a view to obtain the best quality for the experiment. Here is the long-sought-for opportunity to demonstrate practically the value of the two metals, and we doubt not but that our principal firms in this particular interest will respond with alacrity. The Franklin forge, in this city; the Reading forge, at Reading, Pennsylvania; the Bridgewater Works, in the town of the same name in Massachusetts, and many others, will doubtless compete actively for distinction. No better forgings are made in the world than are produced at the establishments mentioned. If the proposals are not made in the shape that parties desire, those companies competing can forward their own propositions to the Ordnance Bureau, and they will be considered accordingly. Hereafter, all the advertisements of this department of the Government will appear in the Scientific American, which will answer a great many inquiries heretofore made of us by our correspondents. The advertisement in question can be found on page 288.

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The Scientific American.

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY
At No. 37 Park Row (Park Building), New York.

O. D. MUNN, S. H. WALES, A. E. BEACH.

TERMS—Three Dollars per annum—One Dollar in advance, for four months.
Single copies of the paper are on sale at the office of publication, and at all periodical stores in the United States and Canada.
Sampson Low, Son & Co., the American Booksellers, No. 47 Ludgate Hill, London, England, are the British Agents to receive subscriptions for the SCIENTIFIC AMERICAN.
☞ See Prospectus on last page. No traveling agents employed.

VOL. VIII, NO. 15...[NEW SERIES.]....*Nineteenth Year.*

NEW YORK, SATURDAY, APRIL 11, 1863.

PERSEVERANCE IN INVENTION.

A thorough acquaintance with mechanical philosophy generally enables a person to judge accurately respecting new projects of a mechanical character. Thus, from a knowledge of nature's laws, it can be positively asserted that what is understood as a "perpetual motion" is impossible; also, that in the present state of science, flying, by man, is impracticable. Such knowledge also enables a person to assert that certain new projects are possible, and based on correct principles, even when repeated failures by experiments cause them to be abandoned for long periods of time. A confirmation of this latter statement has been furnished in the late practical operation of the "pneumatic post" in London. The project, in its most essential features, was old, and repeated experiments had previously failed to ensure its success. A similar plan was proposed by Ithiel S. Richardson, of Boston, Mass., and iilustrated on page 265, Vol. VIII (old series) of the SCIENTIFIC AMERICAN, respecting which we said:—"The idea of sending packages through air-tight tubes is not new, nor is this the first attempt to carry it out, but all plans heretofore tried have proved abortive. The philosophical principle involved in thus transmitting packages, &c., is correct; the difficulties in the way of carrying it out have been mechanical ones." It seemed to us, at the time, that Mr. Richardson had removed many of these difficulties, and it is probable that had his efforts been supported with the capital which has been furnished to the London company, America would have had the first pneumatic post in public operation. William Murdoch, the foreman of James Watt, constructed an air-tight tube, and propelled a hollow spherical carriage through it, about forty years ago; and in 1824 M. A. Vallence, of London, suggested that a huge tube should be laid between London and Brighton and carriages propelled through it, in nearly a similar manner to the one now in operation. It is now ten years since we examined Mr. Richardson's model and saw it operate; in that period the mechanical and pecuniary difficulties which stood in the way of the practical operation of such an invention, have been removed, and our assertions respecting the soundness of the principles upon which it was based, have been verified. Such results afford encouragement to men of science and inventors. Many original inventions take a long time to become fully matured, and a large capital to develop their full benefits. The progress of invention is like a journey into unexplored regions; the way is long, and the traveler is often foot-sore and weary and subject to many disappointments; but when the end is reached, all the toils and difficulties which have been experienced are forgotten in the bliss of success. The atmospheric steam-engine had been in operation for nearly a century before Watt made his great improvement upon it in 1763; it was forty-five years after that event before it was applied to steamboats with permanent results, and sixty-five years before it was applied to carry passengers on railways. Professor Morse invented his telegraph in 1832, but it was not until 1843 that a public telegraph line was erected in America. These facts in the history of inventions teach a useful lesson. An inventor should be slow to abandon original ideas respecting improvements. Patience and perseverance will overcome a thousand difficulties, and at last secure the desired objects.

THE INROADS OF TIME.

Time makes strange havoc with established customs. The old man with the hour-glass and scythe laughs at the feeble devices of man—at his monuments and his works. Mighty mounds in ruined cities crumbling into dust, huge pyramids tumbling to decay, thickly covered with mold and fungi, attest the force of these assertions. Bound by no compacts, fettered by no restraints, the years progress and the seasons annually change. The summer and the autumn shed their wealth upon the earth. The world wastes its substance and renews its life again from the slow consumption continually going on in its organization. Plants die and nourish other plants springing into life, and gases, wasted apparently, assume some other shape and are thus continually subservient to man's use.

If these positions are correct with reference to the globe we inhabit, by what simile or phrase can we express the continual and active rehabilitation of the arts occurring in every branch of science and industry? Where are the slow processes in vogue in trades and handicrafts years ago? Swallowed up in the past, and succeeded by newer, better, and more economical ones. The costly materials that once entered into the composition of certain wares have been, by the patient investigations of science, supplanted by more durable and less costly ones, and the very light we use is continually exhibiting some trace of the inventive genius of man. These are good results, but we want more and still better ones. How wide is the field about us, wherein we may go seeking, not what Diogenes sought—an honest man—but the opening or opportunity to benefit mankind and ourselves also; it is bounded only by the confines of the world itself!

Look at the backwoodsman of the present day—the pioneer of empires—who with stout heart and sturdy arm lays out in the trackless forest the sites of cities and the boundaries of a nation. Compare him with his prototype in years gone by, and we shall have a forcible illustration of the value of useful inventions to the world. The first settlers of this country lived in the most primitive manner. Content to toil, they were unhappy if their cabins came within hailing distance of each other. By slow degrees they cleared the fertile acres and established villages and towns. The progress of the arts was slow, and labor-saving machines were but little known and seldom used. Inured to danger, they plowed the virgin soil with muskets or rifle within reach; and laid down at night with the fear of Indians or of wild beasts weighing oppressively upon them. Through such privations and hardships did our forefathers prepare the way for us. How does the modern "Leather-stocking" lay waste the wilderness? He surveys some suitable tract, and, finding either iron, coal or oil, in untold quantities, dispatches messengers to the commercial cities for spades, powder and rock-drills. He brings portable engines and saw-mills into the woods, and, scattering the dryads and hamadryads right and left, violates those ancient temples of the gods by felling their subjects on either hand. To the root of the oak he lays the cleaving edge of the axe and levels the monarch with the earth; daylight streams in where only a dim religious light reigned before; the call of workmen and the sound of lowing cattle disturb the solitude where lately wild beasts made their dens and savages woke the shrill echoes of the caves with demoniac yells. By some water-course the whistling saws grate sharply against the clinging fibers of the pine and hemlock, and the puffs of steam and smoke from the locomotive soon dart through the tree-clad hills—a type of the indomitable energy and enterprise of the Yankee nation. Were such things and scenes as these possible in old times? By no means.

Look at the cities upon the Atlantic coast and see with what comparative slowness they have grown to their present condition. Contrast with them the great cities of the West, which have in the past twenty-five years attained a consequence and a commercial importance unparalelled in the history of the world. Will any one say that such results as these could have been attained before the age of machinery?

One overwhelming proof of the correctness of the positions here assumed is the fact that those mechanical aids to civilization which have gained so great a celebrity, and have so materially aided the development of the agricultural resources of the West were nearly all invented in the States composing that portion of our country. Active minds, seeing the wants and requirements, supply them; labor being scarce the farmers employ the new implements with, it is almost unnecessary to add, excellent results. And every day and every hour, so far from impairing the value of new inventions, only increases them. The art of invention is a constantly increasing quantity, which brings not only wealth to the individual but to the country—not only redounds to the credit of the discoverer, but to the nation from which he sprang. Clio records no brighter names upon her pages than those of famous inventors, and no honors are more stubbornly contested than those which belong of right to the people who claim any disputed invention as their own particular property.

PRESERVING WOOD WITH PYROLIGNEOUS ACID.

From reliable experiments that have been made in Europe and the East Indies with railway sleepers which had been treated with pyroligneous acid, it has been demonstrated that they endure three times longer than the same kind of timber, not so prepared, when exposed to similar influences. Many improvements that have originated in America have been first generally applied in other countries. This has been the case with respect to the treatment of timber with pyroligneous acid. Its application for such purposes was proposed in this city forty years ago, but it has not yet come into general use here, while it is in very common use in England. In the New York *Daily Advertiser* of Dec. 24, 1823, a description was given of experiments that had been made in treating timber with pyroligneous acid, and its benefits and modes of application were clearly described. No railroads were then in existence; consequently its use was chiefly urged for ship timber exposed to rapid decay. The article on the subject said:—"When seasoned timber or planks are hewn into the intended shape, put them under cover for a week or ten days to protect them from the rain. During this time let the acid be applied to the surface daily with a brush. It will penetrate an inch or more into the wood and will be found an effectual preservative. The central part of the wood or heart of the oak being less liable to decomposition, it will require less of the acid. The frame of the ship or boat may be put together when all the external parts of the timber are completely saturated. Green timber cut in thick forests, after being saturated with this acid, will be nearly as good for ships, steam and canal boats, as the teak wood of the East Indies or the live oak of our sea-coasts."

The pyroligneous acid recommended for this purpose was the condensed smoke of wood. The best way to obtain it is by the distillation of wood in an iron retort and the condensation of its vapor in a refrigerator. The charcoal thus obtained in a retort is of excellent quality for smelting iron, and the crude pyroligneous acid may be applied without any further treatment to the timber. It was not only recommended for ship's timber to prevent dry rot, but also for the timber of gun carriages, posts set in the ground, the sills of wooden buildings, &c. By smoking timber in the same manner that hams are smoked, similar results are obtained, for the preservative agent is the creosote in the fluid and the smoke. In coal tar there is a similar preservative agent called carbolic acid, which in many of its properties resembles creosote. It answers the same purposes as an antiseptic for timber, and is used for this object, but it is disagreeable to apply; wherever it can be obtained conveniently, however, no better substance can be applied to timber intended to be exposed to moisture and the weather, more especially when in contact with the ground. This is a subject which should engage the serious attention of all our railroad companies, as they use vast quantities of timber for sleepers and bridges, and it is becoming scarcer and more expensive every year. Every agency which is adapted to render such timber more durable should be sought and applied.

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THE BROOKLYN NAVY YARD.

The Brooklyn navy yard presents a scene of great activity. It is a grand emporium, whence are transmitted naval stores to various stations on the Southern coast; several thousand mechanics, laborers and others are employed in it. Several vessels belonging to the blockading fleet are at the docks, receiving repairs; others are taking in supplies of war munitions to proceed to distant stations, and a number are delivering cargoes of guns, shot and shell, manufactured at private establishments in different parts of the country. A number of fifteen-inch naval guns, from the Fort Pitt Works, are lying on the dock getting sighted for service; and in the parks guns of all sizes extend in row after row, with interm ediate piles of shot and shell, apparently sufficient to destroy every city and fort in all the regions of Secessiondom. There are over 300 guns of all sizes, including about 50 rifled Parrotts and the same number of bronze howitzers. Most of the cannon are new and of the most approved patterns. The docks and vessels are crowded with sailors and laborers, the shops with artizans and mechanics, and the several yards with active workmen, all busily engaged in making, repairing and transporting engines and munitions of war. Never before have such quantities of naval supplies been seen in that yard; the energies and resources of the country seem to have increased as the war has been prolonged.

In several respects the Brooklyn navy yard is a conservative institution, of a primitive type. Teams of oxen may still be seen in the yards drawing loads, and cargoes are still discharged by the old-fashioned horse-gin. A portable steam engine on wheels, of about eight horse-power, would be far more efficient for such purposes.

THE BEST MATERIALS FOR RAILROAD BRIDGES.

On page 170, this volume, we directed attention to unsafe railroad bridges, and briefly pointed out the defects of timber as a material for such structures. The *Railway Times* (Boston) has taken exception to our remarks, and yet there is scarcely any difference of opinion between us upon the subject. It says:—"In good timber, well put together and well protected, we believe there is more safety than in bad iron put together as some bridges are, and liable at any time to become 'short,' and to lose its fiber by vibration, to say nothing of lack of arrangements for unequal expansion and contraction of the metal." We have no objections to urge against such views, so far as they relate to the character of the materials, but some might draw the inference that the use of bad iron had been advocated in preference to wood of any description. We said in the article referred to: "Wherever it is possible to erect a *good* stone bridge, or one of iron, wood should not be employed. As a question of economy as well as safety, railroad companies would consult their best interests by building all their bridges of the most reliable and enduring materials."

We think upon reflection, no one will question the soundness of those conclusions. Iron and stone are safer and far more enduring materials for railroad bridges than wood. Timber exposed to the weather in a bridge soon decays and becomes unsafe for trains to pass over. It is also liable to take fire, and many structures of the kind have been burned. In passing over wooden bridges the engineers of trains have to close the ash-pan damper, and shut off steam to guard against sparks setting them on fire, and yet with all the precautions which are employed, many bridges are destroyed by fire. As compared with good iron and stone bridges they are certainly far inferior. For temporary purposes, when the funds of a company are moderate, and a railroad has to be constructed rapidly, as in the early years of American railroads, wooden bridges are a necessity; but in these days, most of such structures should be superseded with iron or stone. And it is pleasing to know that such has been the case on several of our railroads, such as the Reading Railroad, Pennsylvania, which bears the heaviest traffic, in proportion to its length, of any line on the continent.

Since our former remarks on this subject were published, we have received the *Engineer* (London), which contains the substance of a paper upon "American Timber Bridges," read on the 24th of February, by J. R. Mosse, before the Institution of Civil Engineers. It is almost a remarkable coincidence taken in connection with the discussion of the question here. In a very able editorial, the *Engineer* comments upon Mr. Mosse's paper, and states that several bridges on the American system have been erected on the Great Eastern Railroad, England. It says:—"We are aware that large sums have already been charged in the company's accounts to the removal of timber bridges, or rather to the substitution of brick and iron structures in place of them. On the West Midland, South Wales, and other lines the same substitution has already been made to a great extent; but we believe that the bridges thus replaced were much superior as a class to those erected in America." These remarks were made by an engineer who is undoubtedly well acquainted with European and American railroad bridges. When we take into consideration that most of our railroad wooden bridges are constructed of timber unprepared with any preservative substance, and that many of their timbers are sometimes not thoroughly seasoned, we think the time has arrived when in most cases that material should be abandoned for such structures. In our best timber bridges, the shoes, tie-rods and tension-rods are made of iron, and these constitute the most reliable and enduring portions of them; why then not use iron altogether, as it is also fire-proof? If good stone bridges were not so expensive, they would and should be universally preferred; next to these come iron bridges of the best quality and combinations.

WONDERFUL SIGHTS IN WASHINGTON.

We recently spent a day in the city of Washington, D. C., and were struck with the extraordinary medley of characters which present themselves on the public thoroughfares. There are statesmen (?), foreign ministers, *attaches*, politicians, civilians, office-holders, office-seekers, admirals, commodores, major-generals, brigadiers, colonels, majors, lieutenants, captains, surgeons, sutlers, peddlers, many soldiers in robust health, some on crutches, some with one arm or one leg or one eye; a few armless, legless, and eyeless; a large number bearing marks of severe disease, and just crawling out from the dismal hospital to bask in the sun; some borne along by their comrades to the railroad cars, with visions of happy homes dancing through their minds; others patrolling the sentinel's weary beat; others galloping down the avenues as if the fate of the nation hung upon the fleetness of each trooper's steed; others marching to and fro, to take the "post of duty," which is to them a post of danger. Besides all these unusual sights, there are countless male and female "contrabands," contractors, gamblers, and mountebanks; horses, mules—or shadows which resemble those animals; then there are hogs, dogs, goats, army wagons, ambulances, forges, caissons, guns, pistols, swords, sabres, knapsacks, and many other things too numerous to specify; indeed it would seem as though the *debris* of the universe had been emptied into the Federal metropolis.

STARTING FIRES UNDER BOILERS.

A very mischievous practice exists in various parts of the country, in reference to starting fires under steam boilers preparatory to raising steam; this duty is entrusted to ignorant watchmen who are too often the agents of disaster. Those men are instructed to light the fire at a certain hour, and generally comply with their orders without exercising the least judgment on the subject; they rarely try the gages to see that there is water in the boiler before fulfilling their duty. We can call to mind several accidents or injuries that have occurred to boilers from this very cause. The Detroit Locomotive Works once had a boiler heated so hot, by the carelessness of a watchman, as to burn the felt lagging on the outside; and many other similar cases might also be cited. We have known instances where watchmen have started the fires under gangs of cylinder boilers, and raised steam in them to such an extent as to drive the water out of some into the others not in use, or not so full; thus running the risk of burning the boilers and causing no end of delay and loss. The men in question ought not to be permitted to meddle in any way with a steam boiler, and no persons except those who are skilled in the management of them, and who are conversant with the properties of steam, should under any circumstances be entrusted with their control. Too many lives have been lost and too much property scattered to the winds by the ignorance of those who were temporarily left in charge of boilers.

THE PROPOSITION TO INTRODUCE A STATE PATENT SYSTEM.

We give considerable space in our present number to the publication of a bill, now pending before the Legislature of Massachusetts, to promote the progress of the useful arts; or, in other words, the Legislature of that State is solicited to enact a patent law, for the purpose of protecting inventors and *introducers* of useful improvements under a State patent system. The document in question is in the hands of the Judiciary Committee, and we have been asked to encourage its passage into the form of law.

At first we were inclined to regard the proposition as a practical joke; but upon looking at the document before us, it bears all the usual marks of having received preliminary legislative action. The principle objection to this scheme is, that it is a positive infraction of both the letter and the spirit of the Constitution of the United States, which confers upon Congress the sole right to enact laws for the protection of inventors and authors for a limited period. Besides this, the United States Courts have sole jurisdiction in patent causes, as well in equity as in law. This bill proposes to introduce into Massachusetts a State patent system, even in the face of those provisions of the Federal Constitution and existing laws. At this particular juncture in the history of the country we look with deep concern upon all such State legislation as tends in the least to impair the force of the *national* authority in respect to its supreme powers. It looks very much like a return towards the defunct Confederate system, which is extremely offensive to us, as it should be to all right-minded loyal men, who desire to see the Federal authority fully upheld.

Another feature of this bill is very objectionable, namely, that wherein it is proposed to grant an exclusive patent to the first *introducer* of a new invention. This plan, in our judgment, is a "bid" for a general piracy upon the rights of the true inventor, and smells too strongly of the English statutes. We cannot favor any such attempt to despoil the rightful inventor, by any possible legislation, of his paramount exclusive right to a patent for his discovery. To attempt to bring in State action, such as is proposed in the bill alluded to, would, we think, lead to much confusion and mischief in our patent system. The Patent Office at Washington is the great national repository of the fruits of American genius; and it strikes us as injudicious and unwise to seek to institute any separate State action that will in any way tend to divert ingenuity from that central point.

We regard the proposed measure as in the highest degree fraught with mischief; and we feel confident that the Legislature of Massachusetts will not be the first to inaugurate so dangerous an innovation upon the rights of the Federal authority. It seems to us that the nation is now struggling to put down this sort of State interference with the supreme law of the land. If every loyal State should undertake to establish its own patent system, the burdens of the inventor would be vastly increased, not only in the cost of obtaining his patent, but also in defending his rights in the several State Courts. The whole thing strikes us as a ridiculous absurdity; and we trust that we shall never hear of it again.

NEW YORK STEAM-BOILER INSPECTION.—According to law the inspection of steam-boilers in this city is embraced in the police-department regulations. From the late quarterly report of the Superintendent of Police, we learn that 566 steam-boilers were examined during the past quarter, of which 270 were tested hydrostatically, and 31 found defective, 5 of which were condemned and the others repaired. Safety valves, gage cocks, pressure and water gages, and connecting pipes were also examined, and no less than 187 of these were found defective.

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RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week. The claims may be found in the official list.

Sewing Machine.—The object of one feature of this invention is to enable a sewing machine to sew equally well whatever may be the direction the driving shaft turns, and to enable the direction of the feed to be changed by simply reversing the movement of the shaft or equivalent, without adjustment of any part of the machine; to this end it consists in a novel construction of the needle-operating cam and feed mechanism and mode of combining them with with the shuttle-operating mechanism, whereby the desired result is obtained. Another feature of the invention relates to the isolation of that portion of the bed of a shuttle machine which contains the raceway, from the rest of the bed, in such manner as to allow the work to pass around it as around a cylinder, and it consists in a certain mode of driving the shuttle and feed mechanism, which obviates the necessity of making the isolated portion of the bed very large or of crowding the said mechanism. Another feature consists in an improvement in the shuttle by which its thread is caused to be drawn up with more uniform tightness, and more uniform stitches are produced and the danger of breaking the said thread is obviated and its slack is prevented from interfering with the needle-thread. Mervin R. Smith, of Armonck, N. Y., is the inventor of this sewing machine.

Boiler Felt.—This invention consists in impregnating and coating felt, whether made of hair or other material, with silicate of soda or soluble glass, the object being to prevent its being charred by the heat of a boiler or other apparatus to which it may be applied to and render it a better non-conductor of heat and protection against combustion, thereby enabling a felt of less thickness to be used than would otherwise be required. Moses A. Johnson, of Lowell, Mass., is the inventor of this process.

Sewing-machine Guide.—The object of this invention is to provide for the folding of the edge of the band and the putting together and sewing, in a sewing machine, of the crown piece and band of a cap or hat lining. It consists in a guide of novel construction for folding the edge of the band; also in the combination of such guide and circular rotating disk carrying the crown piece with each other and with a sewing machine, for putting the crown piece and band together and guiding them to the needle of the machine to be sewed. Rudolph Eickemeyer, of Yonkers, N. Y., is the inventor of this improvement.

Block for pressing Felt Hats.—This invention is applicable to all dies and blocks, whether of metal or other material, on the exterior of which the bodies of hats or other coverings for the head are pressed or formed, either by the use of an external die, by ironing by hand, or by other means. Its object is to provide for the pressing and forming of crowns of bell or other shape which renders the successful use of a solid die or block impracticable, owing to the difficulty of removing the hat therefrom; and it consists in a certain construction and arrangement of a series of pieces of which the die or block is composed, and a certain mode of combining and operating the same, by which the above result is obtained. R. T. Wilde and S. H. Lyon, of Brooklyn, N. Y., are the inventors of this machine.

Forge Fire.—This invention consists in the arrangement of a hollow water-chamber front in relation to the fire-place of a Lehigh fire and to the flue leading from that fire-place to the chimney or smoke stack, in such a manner that the fire is inclosed on all sides except the front, thereby causing the gases to come to the front, where the same, by coming in contact with the cold air and chamber front, form a combustible mixture which acts as a part of the fuel. The invention consists further in the arrangement of hollow air-chambers surrounding the fire on all sides and supplied with a current of of cold air, which serves for the blast, in such a manner that the persons working at or near the fire, are protected against the heat, which, in Lehigh fires of the ordinary construction, radiates from the walls to the great inconvenience and injury of the health of the workmen employed at or near said fire. John Evans, of New Haven, Conn., is the inventor of this device.

Machine for welding Railway Bars.—This machine is composed of a ram and a die having their faces of the form of the two sides of a railway bar; the die secured firmly to a fixed block or bed-plate, and the ram being fitted to guides in the said block or plate and attached to a piston working within a steam cylinder secured to the same block or plate; the object being the direct application of steam power to the welding and repairing of railway bars. John C. Park, of Buffalo, N. Y., is the inventor of this improvement.

THE MASSACHUSETTS STATE PATENT BILL.

AN ACT TO PROMOTE THE PROGRESS OF THE USEFUL ARTS.

Be it enacted by the Senate and House of Representatives, in General Court assembled, and by the authority of the same, as follows:—

SEC. 1. That any person or persons, who may or shall first introduce into this State, from any other State or country, any useful art, machine, manufacture or composition of matter, or any improvement thereon, or any design for a manufacture or composition, whether the said design appertain to any of the fine or useful arts (and such art, machine, manufacture, composition of matter, improvement or design, as the case may be, shall not be in public use within this Commonwealth by others), and who shall or may desire to obtain an exclusive property therein, may make application in writing to the Secretary of the Commonwealth, expressing such desire, and the said Secretary, on due proceedings had, may grant a patent therefor, conferring on the said introducer, for a term not exceeding twenty-eight years, the exclusive right to make, vend, and use within the Commonwealth of Massachusetts, the said introduction. But, before any person or persons so introducing into the Commonwealth any such art, machine, manufacture, composition of matter or design, shall receive such patent, he, she, or they, as the case may be, shall deliver to the said Secretary, two written descriptions of the same, and the manner of constructing, using and compounding the same, in such full, clear, and exact terms, avoiding unnecessary prolixity, as to enable any person skilled in the art or science to which such introduction may appertain, or with which it may be most nearly connected, to make, construct, compound and use the same; and the said introducer shall particularly specify and point out and declare what is claimed to be the subject so introduced, and shall, furthermore, accompany each of such descriptions with a drawing or drawings of the subject introduced, whensoever the nature of the case may admit of such, which descriptions and drawings shall be signed by the applicant or applicants, and attested by two witnesses. The applicant or applicants shall also make oath or affirmation, that he, she, or they verily believe himself, herself or themselves to be the first introducer or introducers of it into the Commonwealth of Massachusetts, and that he, she or they do not know or believe the same was ever before known or introduced or used therein. And, furthermore, the said applicant or applicants shall pay to the Treasurer of this Commonwealth, for the use of the State, the sum of ten dollars.

SEC. 2. No such patent, so granted, shall be valid against any patent granted under any act of the Congress of the United States, for the subject of such introduction, while such United States patent may be in force.

SEC. 3. All patents, so issued by the Secretary of the Commonwealth, shall be issued in the name of the Commonwealth of Massachusetts, and under the seal thereof, and shall be signed by the Governor and be countersigned by the Secretary of the Commonwealth, and one of the two sets of specifications and drawings, deposited in the office of the latter, shall be filed therein, and the other set shall be attached to and make part of the patent, which shall also contain a short description or title of the subject of the application, to indicate its nature and design, and such patent, in its terms, shall grant to the applicant or applicants, his, her, or their heirs, administrators, executors, or assigns, for a term not exceeding twenty-eight years, the full and exclusive right of making, using, and vending to others to be used, the subject covered by the patent, as set forth in the specification or specifications and drawings, annexed thereto.

SEC. 4. Any such patent shall be assignable in law, either as to the whole interest or any undivided part thereof, by any instrument in writing; but every grant and conveyance or license, under such patent, shall be recorded, within three months after its execution, in the office of the Secretary of the Commonwealth, to whom, for the use of the Commonwealth, the assignee or grantee shall pay the sum of two dollars for making such record, and in default of such record the said assignment, or license, as the case may be, shall be void.

SEC. 5. When any application for such patent shall be made, and the applicant shall die before the grant of the patent, such patent may be issued to the executor or administrator of such applicant in trust for the heirs-at-law or legal representatives of the deceased. So, also, when an applicant, after or at the time of making application for any such patent, and previous to its being issued, may assign or transfer his right and title to it, and the subject of it, to any other person or persons, the patent, on the request of the applicant, or his assignee or assignees, shall be issued to the said assignee or assignees; the assignment being put on record, and the fee paid, as hereinbefore provided.

SEC. 6. Whenever such patent, by reason of a defective or insufficient specification or claim, may be inoperative and invalid, the defect or insufficiency having occurred through mistake or inadvertence and without any fraudulent or deceptive intention, it shall be lawful for the Secretary of the Commonwealth, upon surrender of such patent to him, the depositing with him of two corrected specifications, or specifications and drawings, as the case may require, and the payment to him of ten dollars for the use of the Commonwealth, to prepare and re-issue the patent in a corrected form, and for the balance of the then unexpired term for which the original patent was granted.

SEC. 7. All actions, suits, controversies and cases, as to the validity of any such patent or in respect to any infringement on the rights of the holder thereof, or in respect to injunctions to restrain any person or parties from infringing the rights of a patentee or an assignee under a patent, shall be determinable by the supreme judicial court of this Commonwealth, which, on a proper hearing of the same, may decide on the validity of such patent or on the damages to which the patentee or his assignee may be entitled. And the said court, provided it may satisfactorily appear that the patentee was not legally entitled to the patent, shall have power to declare and adjudge it to be null and void, in which case a record of such annulment shall be filed by the clerk of such court with the Secretary of State, who shall, on the specification deposited with him, by means of a suitable paper to be attached thereto, make due certificate of such decision.

SEC. 8. Before any such patent shall be granted, the applicant therefor, under the direction of the Secretary of the Commonwealth, shall give public notice of his application, which notice shall be published for the space of one week in at least two daily newspapers published within this Commonwealth (one of which shall be published in the city of Boston), in order that any person or persons may have an opportunity of opposing the granting of such patent; and it shall not be granted when it may be proved to the full and entire satisfaction of the Secretary of the Commonwealth that the invention or subject for which the patent may be requested, has before been introduced, or used, or invented within this Commonwealth.

SEC. 9. Whenever a patentee of a State patent shall desire an extension of his patent beyond the term of its limitation, he may make application therefor, in writing, to the Secretary of the Commonwealth, setting forth the reasons for such extension. He shall also pay into the treasury of the Commonwealth the sum of fifty dollars, and shall cause to be published daily, and for the space of one week, in at least three newspapers published in this State (one of which shall be published in the city of Boston), a notice of such application and of the time and place which may be determined by the Secretary of the Commonwealth for hearing on his petition, that any person opposing such extension may have an opportunity to be heard. And the Secretary of the Commonwealth shall hear and decide upon the evidence produced before him, both for and against the extension; all arguments and evidence before him being in writing. The patentee shall present to the Secretary a statement, under oath, of the profit or loss he may have met with in respect to his patent or the object covered by it. And if, upon the hearing of the case, it shall appear to the full and entire satisfaction of the Secretary that the patent ought to be extended for a further term, not exceeding fourteen years, by reason of the patentee, without neglect or fault on his part, having failed to realize a reasonable remuneration for his efforts to introduce the subject of the patent into this Commonwealth and into public use therein, or to introduce it into public use, as the case may be, it shall be the duty of the Secretary to renew and extend the patent for a period not exceeding fourteen years from the expiration of its original term, such renewal or extension being effected by a suitable certificate made on or attached to the patent. And the Secretary shall also keep in his office a record of such extension, and the patent so extended shall have the same effect in law as though it had been originally granted for its original and additional term: *Provided*, that any such application for an extension of a patent shall be made at least ninety days prior to the expiration of the original term for which such patent may be granted.

SEC. 10. Any person making application therefor may have certified copies of any records or drawings, or papers—relative to any patent or patents—that may be filed in the office of the said Secretary of the Commonwealth: *Provided*, the applicant shall pay for the same the cost of making such copies, and the sum of fifty cents in addition thereto for their certification. And any such copies duly and properly certified by the Secretary of the Commonwealth, and under the seal thereof, shall be received in evidence in any of the State courts in behalf of the party or parties by whom they may be presented.

SEC. 11. Whenever, by mistake or inadvertence, and without any fraudulent intention, a patentee may have made the claim of his patent too broad, he may enter in the office of the Secretary of the Commonwealth a disclaimer of such part or parts, before claimed by him, as he may consider he has no just right to claim. And on the filing of such disclaimer he shall also file a duplicate of it, and pay to the Secretary, for the use of the treasury of the Commonwealth, the sum of five dollars; after which the Secretary shall duly attach the disclaimer to the patent, and with a certificate of the time when it was filed and attached; after which the patent shall be deemed to cover or be for all the subject thereof, excepting the matter disclaimed.

SEC. 12. The Secretary of the Commonwealth shall keep in his office a list of all patents so granted, and such list shall designate, under proper heads, the subjects and dates of such patents, the names and places of residence of the patentees, and the term or terms for which such patents may be granted. And he shall also keep a proper list of all extensions, re-issues, disclaimers and assignments, relative to such patents, which lists shall be open to the free inspection of any person or persons who may be desirous of examining the same.

SEC. 13. In all cases where an article is made or vended by any person under the protection of letters-patent, it shall be the duty of such person to give sufficient notice to the public that such article is so patented, either by fixing thereon the words "State Patent," and the date of the patent, or when from the character of the article patented, that may be impracticable or seriously inconvenient, by enveloping one or more of the said articles, and affixing to the package a label, on which the notice is printed, or otherwise suitably and clearly made to appear; on failure of which, in any suit of such party brought by him for an infringement of the patent, he shall not be entitled to recover any damage, except on proof that the defendant was duly notified of the infringement, and continued it after such notice.

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ISSUED FROM THE UNITED STATES PATENT OFFICE
FOR THE WEEK ENDING MARCH 24, 1863.

Reported Officially for the Scientific American.

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37,943.—Trimming or cutting Bolts.—Hiram Beckwith, Grass Lake, Mich. :

1 claim the bars, A C, provided with the semicircular recesses, e e, and cutters, G G, in combination with the link, B, cam, D, and lever, E, all constructed and arranged as shown, to form a new and improved implement for the purpose specified.

[The object of this invention is to obtain an implement of simple construction which may be used for expeditiously cutting or trimming off the ends of screw bolts close to the nuts. The invention is more especially designed for trimming off the bolts of carriages, but may be advantageously employed in other work.]

37,944.—Marine Governor.—H. J. Behrens, New York City :

I claim, first, The combination with an ordinary pendulum or ball governor, A, of a universal joint, or gimbal, B C D, constructed substantially as herein described, for the purpose set forth.

Second, The arrangement of the three bevel wheels, E F G, with the driving shafts, j, pivot, h, and spindle, d, of the governor, A, when the latter is suspended from a universal joint or gimbal, B C D, substantially as and for the purpose herein shown and described.

Third, So arranging the rising and falling rod, f, with the governor, A, and universal joint or gimbal, B C D, that the top of said rod coincides with the universal center of the gimbal when the balls of the governor assume their mean position, substantially as and for the purpose specified.

Fourth, Placing the rod, I, which transmits the motion of the balls to the throttle valve, loosely on the top of the rising and falling rod, f, substantially as and for the purpose specified.

37,945.—Lamp Burner.—J. O. Blythe, Philadelphia, Pa. :

I claim the peculiar construction of the burner, S, in combination with the collar, F F, and the tube plate, I I, as combined with it (the tube) and attached to the screw in the top of the lamp, as shown in the drawing, or in Fig. No. 4 ; this burner having no perforations in its sides or wire cloth, and rising above the collar, and having a narrow flange turned over at the top with a screw cut upon it, as substantially described and set forth.

37,946.—Implement for Disabling Ordnance.—Adolphus Bonzano, Detroit, Mich. :

I claim the apparatus for disabling ordnance, composed of a block, A, having grooves, c c, with inclined bottoms, a series of cutters, B B, fitted to the said grooves, and a series of springs, C C, applied to the cutters, the whole combined and operating substantially as herespecified.

37,947.—Damper.—Edward and John Bourne, Pittsburgh, Pa. :

We claim moving the disks on the doors by means of the rod passing through their hinges, in combination with the frame thereof, in the manner as herein set forth.

We also claim combining the disks with the rod by means of the toothed segments and the circular racks, so as to admit of the doors being opened and closed without being effected by the mechanism of the parts.

37,948.—Tobacco-spinning Machine.—Ernst Breul, Hanover, Kingdom of Hanover :

I claim, in combination with the revolving spinning frame, the revolving drum, P, for spinning and winding tobacco, substantially in the manner and for the purposes set forth.

I also claim, in combination with a spinning frame and winding drum, P, substantially as herein described, the screw shaft, x, and guide roller, F', when constructed and operated substantially in the manner and for the purposes herein set forth.

37,949.—Bill-holder.—Alexander Buswell, San Francisco, Cal. :

I claim the plate, F, with its bevel projection, f, and lateral opening, e, in combination with the plate, G, with its tongue, g, when used in connection with elastic bands applied to a bill-holder, substantially as and for the purposes set forth.

37,950.—Soldering Sheet-metal Eaves-troughs.—E. H. Camp, Jackson, Mich. :

I claim the semicircular box, A, provided with rockers, G G, and bands, B, curved at one end, as shown, to form recesses, a, with a rod, C, secured within them, in combination with the straps, D, arranged as shown, and adjusted by screws and nuts, or their equivalents, for the purpose specified.

[This invention consists in the employment or use of a semicircular box provided with clamps and fitted on rockers, all being arranged in such a manner that the sections of the trough may be firmly clamped in the box and the sections soldered together with the greatest facility.]

37,951.—Manufacture of Paper-stock from Wood.—P. A. Chadbourne, Williamstown, Mass. :

I claim, first, The inclined reciprocating rasps, files or scrapers, I, in combination with the rotating log, J, placed between centerpoints, c c', and within a cistern, A, all arranged to operate as and for the purpose specified.

Second, The attaching of the rasps, files or scrapers, I, to springs, G, arranged substantially as shown, in relation with the log, J, to insure the pressure of the rasps, files or scrapers, against the log, at all times during the gradually-diminishing diameter of the same.

Third, The combination of the crank shaft, D, connecting rods, E E, bar, F, spring, G, rasps, files or scrapers, I, screw, K, rotating arbor, M, from which the shaft, D, is driven by a belt, P, the log, J, and cistern, A, all arranged for joint operation, as and for the purpose specified.

[This invention consists in rasping, filing or scraping wood while submerged in water or saturated therewith by the action or flow of a stream, whereby the fiber of the wood is strengthened or made sufficiently tough to avoid injury by the action of the rasps and other tools employed in the reducing of the wood, and a perfect separation of the individual or ultimate fiber from several united or connected fibers attained, and the rasps or other tools also kept, while in operation, in a perfectly clean state in proper working order.]

37,952.—Apparatus for Folding the Plaits in Shirt-bosoms.—F. M. Chandler, Buffalo, N. Y. :

I claim the combination of the stop catch, B, and spring bar, C, or either of them, with the plates and board, when arranged and constructed in the manner and for the purpose substantially as set forth.

37,953.—Converting Motion.—Perry Dickson, Utica, Minn.:

I claim the employment, in combination with each other and the dogs, b b*, and their carrying levers, of a pin, k, with cranks, i l, a spring, f, and a cord or chain, g, the whole operating substantially as and for the purpose herein set forth.

[This invention relates to the employment, to operate upon the interior of the rim of a wheel or pulley for the purpose of producing its rotary motion, of a system of dogs, so applied in connection with a lever arranged to oscillate upon the shaft of the said wheel or pulley that in the movement of the lever in one direction the dogs will work free of the rim and in its movement in the opposite direction they will bite the rim and transmit motion to the said wheel or pulley and to its shaft. The improvement consists in certain devices employed in connection with a double system of dogs, to provide for the reversal of the rotary motion at pleasure.]

37,954.—Roller Temple for Looms.—W. W. Dutcher, of Milford, Mass. :

I claim, in combination with the trough so made, and with the cap of the roller, the extension, b, arranged so as to project downward from the cap and across the inner end of the roller, substantially as described.

I also claim the improved temple, made not only with its cap and trough closed at both ends of each, but having such a trough formed in two separate parts and connected together by screws or their equivalents, as specified.

37,955.—Wagon for transporting Medicines.—Jacob Dunton, Philadelphia, Pa. :

I claim the subdivision of the body of a wagon or cart into a number of packages or compartments, so constructed and arranged that they will adapt themselves to the twisting and lurching of the wagon, preserve their contents from injury and be capable of convenient transportation on the backs of animals, substantially as set forth.

[By this invention medical stores are adapted for ready and safe conveyance either in vehicles or on the backs of animals, and are at all times accessible for immediate use.]

37,956.—Lamp Cone.—M. B. Dyott, Philadelphia, Pa. :

I claim corrugating or swaging the sides of the cone or deflector so as to form prominences or indentations, by which the necessary supply of air is prevented from being intercepted or cut off, whether admitted through perforations in the base of the cone or through air ducts formed by corrugations or prominences upon the base of the cone, substantially as and for the purpose above set forth.

[This invention consists in corrugating the side of the cone or deflectors, or swaging or indenting the same in such a manner that the chimney which rests upon the base of the cone or deflector, cannot, in consequence of any lateral movement or play, cover any of the apertures in the cone through which air is admitted to the flame at the outer side of the cone—a contingency which frequently occurs with the cones in ordinary use.]

37,957.—Sewing-machine Guide.—Rudolph Eickemeyer, Yonkers, N. Y. :

First, I claim the guide, B C, constructed with holes, d, which are arranged in such oblique direction that they not only admit the finger and thumb to draw the band into the guide, but guide the finger and thumb in the proper direction to commence the turning of the fold, substantially as herein specified.

Second, The guide, B C, and rotating disk, F, combined with each other and with the sewing machine, substantially as specified.

37,958.—Forge Fire.—John Evans, New Haven, Conn. :

I claim, first, The arrangement of the hollow water chamber front, D, in combination with the fire-place, B, of a Lehigh fire, A, constructed and applied substantially as and for the purpose set forth.

Second, The arrangement of the air chambers, G G', in combination with the fire-place, B, of a Lehigh fire, A, and communicating with the air-supply channel, j, and discharge pipe or tuyere, m, the whole being constructed and operating substantially as and for the purpose specified.

37,959.—Submarine Lantern.—G. W. Fuller, Cambridgeport, Mass. :

I claim a lantern as made or provided with an air induction conduit, and with a valve opening and valve arranged with respect to the body of the said lantern and for the purpose of supplying air to the lamp thereof, and of discharging the smoke and spent products of combustion into the water, when the lantern may be submerged therein, as specified.

I also claim the combination for applying the glass window, b, to the body, A, of the lantern, and so as to enable such window not only to be closed with a water-tight joint, but to be opened on a hinge for the purpose, as described, the same consisting of the rings, c d, the hinge and the sections of screws connected with or applied to the rings and the lantern case, substantially as specified.

I also claim the combination and arrangement of the air-ventilating devices, N O, and their screw stoppers or their mechanical equivalents, with the lantern body or case, the same being for the purpose set forth.

I also claim the arrangement or combination of the air inlet or inlets, q, with the lamp, and glass window, in manner so that the air forced into the lantern case may be, on its entrance therein, discharged either against the inner surface of the glass window, or upward between the same and the flame or chimney of the lamp, the same being for the purpose hereinbefore set forth.

I also claim the combination and arrangement of mechanism for raising the glass chimney and the conical deflector, in order that access may be had to the wick, the same consisting of the frame, u, the forked lever, a', and the connecting bars, z z ; the said frame, u, being provided with guides, as specified.

I also claim the arrangement of the mariner's compass, viz., within the lantern body and with respect to the lamp and the window of the said body or on the lever, a', as specified.

I also claim the combination and arrangement of the water-receiving and guard chamber, R, and chimney cap or dome, Q, with the opening, P, and the valve seat, S, and valve, T, applied or arranged with respect to the lamp, and the lantern body, substantially as specified.

I also claim the combination of the check nut, W, with the handle, X, the cap, V, and the screws by which the latter is connected to the upper part of the lantern case.

37,960.—Lathe for turning Irregular Forms.—F. T. Grant, Augusta, Maine :

I claim the sliding collar, a, or its equivalent operated by a cam, j, or its equivalent to operate the knife, d, in any way or manner that it may be attached to sliding roller, a, as is specified and set forth.

I claim the whole principle of the sliding collar, a, in any manner that it may be moved, as specified, and in any way or manner that it may be attached to the expanding knife, d, as is set forth and for the purpose specified.

I also claim the v-shaped feed rolls, k k, when combined with the double-acting lever, e, as set forth and for the purpose specified.

I also claim the mode of fastening the knives, d b, as set forth and specified.

37,961.—Revolving Fire-arm.—Albert Hall, Danville, Iowa :

I claim, first, The suspended sere, I, constructed and arranged in combination with the hammer and trigger, substantially as herein specified.

Second, The stop dog, y, arranged in rear of the cylinder within the frame and combined with the hammer by means of hooks, y2 and z, substantially as herein described.

Third, The lever, K, constructed and applied in relation to the cylinder and combined with the pin, h, and with the extension, F2, of the hammer, substantially as and for the purpose herein specified.

Fourth, The combination with the so-constructed and applied lever, K, of the bevel, x, at the bottom of the slot, w, in the recoil shield or frame through which the said lever works, substantially as and for the purpose herein specified.

Fifth, The plate, L, constructed and applied in combination with the barrel and cylinder, substantially as and for the purpose herein specified.

Sixth, The hole, 16, in the recoil shield below the frame, arranged in combination with the opening in the plate, L, substantially as and for the purpose herein specified.

[This invention consists in a novel construction and arrangement of the several parts of the lock of a revolving fire-arm, whereby the whole of the hammer, with the exception of the thumb-piece, is brought within the frame, and the arm, more especially if a pistol, is made more compact ; and whereby the action of the trigger is rendered easier and more like that of a hair trigger. It also consists in the novel construction and mode of applying a moveable plate to provide for the loading of the chambers at the front of the cylinder and for confining the loads in the chambers after their insertion. It also consists in the arrangement, in combination with such movable plate, of an opening in the lower part of the recoil shield to provide, in reloading the chambers, for the pushing out of exploded percussion primers of peculiar construction, which are employed in the cartridges with which it is proposed to load the arm.]

37,962.—Fruit Jar.—Willet Hicks, Trenton, N. J. :

I claim, first, The use of the washers, centerport or standard cross bar, &c., for the purpose of preventing the cork and cement from being forced by the pressure of the atmosphere into the body of the jar, can or jug.

Second, I also claim the use of the said washers, centerport or standard with eye, cross-bar, &c., for the purpose of more easily extracting the stopper from the mouth of the can or jar, substantially as described.

37,963.—Grain Screen.—W. G. Hoag, Hoosick, N. Y. :

I claim the arrangement of the screens, A C E, and guiding boards, b d D, and delivery points, a c e, in a frame having a shake motion, for the purpose of cleaning and separating flax and other small seeds, substantially as herein described and represented.

37,964.—Potato-digger.—Henry Holcroft and C. S. Smith, Media, Pa. :

We claim, first, The arrangement of the sifting drum, D, with the perforated partitions, c, and rotary digging teeth, g, constructed and operating in the manner and for the purpose herein shown and described.

Second, The arrangement of the adjustable cam, E, in combination with the stationary cam, G, toes, h, and digging teeth, g, constructed and operating substantially as and for the purpose herein specified.

Third, The arrangement of the sifting drum, D, with perforated partitions, c, and self-adjusting rotary-digging teeth, g, in combination with the receiving box, H, constructed and operating substantially as and for the purpose set forth.

[This invention consists in the arrangement of a series of self-adjusting rotary digging teeth, the position of which is governed by a stationary and regulated by an adjustable cam, in combination with a rotary sifting drum provided with a series of perforated partitions to separate the dirt from the potatoes, and with a receiveig box into which the potatoes are discharged from the sifting drum, and which is provided with a spring valve to be opened whenever the receiving box is full, or when it is desirable to discharge its contents in such a manner that the potatoes are dug up by the digging teeth and separated from the dirt by the sifting drum, and that the potatoes, after having been collected in the receiving box, can be deposited on the ground or in bags in such quantities as may be desired.]

37,965.—Hay-elevating Fork.—G. C. Howard and Isaac N. Wilfong, Philadelphia, Pa. :

We claim the cap, E, formed and adapted to the stem, A, and arranged for being locked to and unlocked from the bail, substantially as described in combination with a spiral spring, F, contained in a recess formed in the said stem, the whole being arranged and operating substantially as and for the purpose herein set forth.

37,966.—Stove.—James R. Hyde, Troy, N. Y. :

I claim a stove, having a boiler, A, suspended with one upright side against the upright rear end, B, of the stove, by means of hangers, e e, extended up rigidly from the boiler, and loosely engaged with the ordinarily projecting part, c, of the top plate, D, of the stove, at places, g g, above the top, f, of the boiler, and over the side or portion thereof nearest to the stove, substantially as and for the purpose herein described and set forth.

37,967.—Covering for Steam Boilers.—Moses A. Johnson, Lowell, Mass. :

I claim the impregnation and coating of felt with silicate of soda substantially as and for the purpose herein specified.

37,968.—Machine for dove-tailing and relishing Sashes.—George L. King, Philadelphia, Pa. :

I claim, first, Cutting a perfect female dove-tail and relish, with saws at one operation, substantially in the manner described.

Second, Cutting a perfect male dove-tail with saws at one operation substantially as set forth.

Third, Arranging the frame, G, which supports the saw shafts, F, to turn on a center, so as to bring the saw at an angle with the stuff to cut the bevel side of the female dove-tail, substantially in the manner described.

Fourth, Combining and arranging the transom plate, H, with the frame, G, when operating substantially as and for the purpose set forth.

Fifth, The combination and arrangement of the reversible guard, P, and arms, t and t', with the sliding table, N, when arranged in the manner described, or in any equivalent manner to produce the same effect, for the purposes set forth.

37,969.—Wheel for Harvesters.—Peries Lincoln, Cold-Water, Mich. :

I claim the peculiar arrangement and combination of rollers, D D D D D, with the stationary arms, B B B B B, and revolving rim with flange, C, and A, as set forth.

37,970.—Pick or Ax.—Albert Moore, San Francisco, Cal. :

I claim the pick, a, with the projecting piece, b, the socket, d, and key, f, constructed, combined and arranged as herein set forth.

37,971.—Ratchet Brace.—L. H. Olmsted, Yonkers, N. Y.:

I claim, first, The arrangement and combination of the dog, b, pivot, a, stop, c, handle, F, and serrated wheel, E, all constructed and operating substantially as and for the purpose shown and described.

Second, The arrangement of the clamp, G, in combination with the stud, d, or its equivalent, and with the nut or screw, D, of a ratchet brace constructed and operating substantially as and for the purpose specified.

37,972.—Welding and repairing Railroad Bars.—John C. Park, Buffalo, N. Y.:

I claim the machine for welding or repairing railway bars, composed principally of a block or bed-plate, A, a die, B, a ram, C, a piston, F, and a steam cylinder, L, the whole combined to operate substantially as herein set forth.

37,973.—Gimlet.—Arthur Pell, New York City:

I claim a pocket gimlet composed of the tube, D, and a gimlet provided with a head or knob, C, at the end of its shank, A, the knob having a hole or opening, a, made through it to receive the tube, D, when required, and provided at its inner end with a screw, b, to fit when required into an internal screw, c, in the open end of the tube, D, all constructed and arranged as described.

[This invention consists in having the end of the gimlet, opposite to that on which the screw or boring device is formed, provided with a head or knob having a hole or opening made laterally through it, and provided at its inner end with a screw thread, and using in connection with the gimlet and knob thus formed, a tube or case of such diameter that it may be fitted in the hole or opening in the knob and made to serve as a handle for the gimlet, when the latter is required for use, and also made to receive the gimlet when not required for use, the screw on the inner end of the knob being secured into an internal or female screw at the open end of the tube or case.]

37,974.—Straw-cutter.—John G. Perry, South Kingston, R. I. :

I claim the combination of the smooth cylinder, C, with the cylinder, E, having a knife or knives arranged as herein described and for the purposes set forth.

37,975.—Mode of removing Stains from Glass.—Julius G. Pohle, Morrisania, N. Y., and James N. Crow, Mott Haven, N. Y. :

We claim the application of the within-described solution for the pur-

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pose of removing or eradicating stains or burns from glass substantially in the manner set forth.

[The object of this invention is to remove the iridescences or peacock-colored stains frequently appearing on window glasses, &c., such glass being known in the trade as "stained" glass or "burnt" glass; said stains being sometimes designated as glass "rust" or known by various other designations.

37,976.—Machine for planing and dressing Ivory.—Ulysses Pratt, Deep River, Conn.:

I claim, first, The combination of the rotary cutters, D E, and reciprocating bed, G, the latter being provided with a recess, K, having an inclined bottom, a*, all arranged to operate as and for the purpose herein set forth.

Second, The hopper, M, in combination with the rotary cutters, D E, reciprocating bed, G, provided with the recess, K, and the taper or wedge-shaped-block, O, all arranged substantially as and for the purpose herein specified.

[The object of this invention is to obtain a machine of simple construction by which ivory slabs for piano-forte keys may be planed in proper taper form, and also roughened in order to admit of them being firmly secured to the keys.]

37,977.—Milk Can.—Henry Preston & James Mahood, Philadelphia, Pa.:

We claim as an improved article of manufacture, milk cans having the single, solid, tin plate bands, a2, the said bands being constructed, applied, and secured to the vessel, A, in the manner described and set forth, for the purposes specified.

37,978.—Seed Drill.—Barnerd Regan, Miamisburg, Ohio:

I claim, first, The combination of the oblique grooves, d d, and ridges, e e, of feed-wheel, D, with the oblique sill, c, of delivery opening, E, substantially as and for the purpose described.

Second, Separating the transverse sections of feed-wheel, D, by a washer, w, or washers; or what is equivalent thereto, forming notches, n n, in ridges, e e, of the same; substantially as and for the purpose set forth.

37,979.—Projectile for Rifled Ordnance.—Benjamin S. Roberts, United States Army:

In a projectile for rifled ordnance composed of a body of cast-iron, and a cup or band of soft metal and having upon its body a shoulder running transversely around the same and a spindle furnished with longitudinal tongues and grooves, I claim, first, constructing the projectile of such proportions that the soft metal shall so embrace the center of gravity of the entire projectile as to furnish a bearing for the same, while passing through the common substantially in the manner and for the purpose above described.

Second, In a projectile constructed as described in the preceding claim, I further claim forming the surface of the spindle in the shape of a parabaloid or such an approximation thereto that the soft metal may by the force of the explosion be crowded uniformly outwards on all sides and at all parts of its length whereby the axis of the projectile may be placed and held firmly in the axis of the cannon while passing through the same, thereby securing a steady motion of rotation to the shot throughout its flight, substantially as and for the purpose above described.

37,980.—Steam Engine Indicator.—C. B. Richards, Hartford, Conn., assignor to C. T. Porter, New York City:

I claim the means substantially hereinbefore described for giving to the marking point a range of motion greater than that of the piston by which it is actuated, in combination with the described means or an equivalent therefor by which the marking point is caused to travel in a straight line; substantially as and for the purposes hereinbefore specified.

37,981.—Pattern for Molding Pipes.—George Ross, Newport, Ky.:

I claim, first, The application to the pattern, A, of a movable sectional ring, B, or its equivalent capable of being pushed out and drawn in while the pattern is in the sand, in the manner and for the purpose substantially as specified.

Second, The arrangement of the rising and falling conical plunger, D, and springs, C, in combination with the studs, d, and sectional ring, B, constructed and operating substantially as and for the purpose shown and described.

[The invention consists in the application to the pattern which is used in molding pipes, of a sectional ring or belt, or of a series of movable buttons, arranged in such a manner that the same can be pushed out beyond the surface of the pattern and drawn back again while the pattern is in the sand, thus producing a belt or projections which strengthen the pipe and increase the thickness of the metal at such places where the pipe is to be tapped.]

37,982.—Press for bending Ship's Armor-plates.—Edward Sauer, New York City:

I claim the combination with each other and with the bed, A, and platen or follower, B, of the two sets of dies, F F, and G G, constructed as described and separately adjustable both bodily and at either end, substantially as and for the purpose herein specified.

And I also claim combining the bed, A, and platen or follower, B, to which such dies, F F, and G G, are attached, by means of hinged or pin-jointed bolts, D D, substantially as and for the purpose herein specified.

[This invention consists principally in a novel system of adjustable dies so combined with a bed and platen or follower as to provide for the bending of armor or other plates of varying regular or irregular curvature.]

37,983.—Coal-oil Lamp without a Chimney.—J. W. Schreiber, New York City:

I claim the combination of the rounded top wick-tube, c, and the perforated jacket, b, when the latter is provided with a slot or opening, h, in its top having its central part narrower than at its ends, as herein set forth.

[This invention consists in having the upper end of the wick-tube, which is of the ordinary flat form, rounded at its upper end, and having the wick-tube enclosed within a perforated jacket, the upper end of which is provided with a slot or opening contracted at its center and enlarged at its ends, whereby a good illuminating flame is obtained without the aid of a chimney.]

37,984.—Green Ink.—George Smillie, New York City:

I claim a printing ink having for its basis a compound of chromium and asbestos or other analogous and suitable material as herein described.

[The basis of green ink commonly used in steel-plate and other printing, is composed of anhydrous oxide of chromium. This, by reason of the hard and sharp character of its particles, wears away the plates or other printing surfaces very rapidly, and when used for bank-note printing, rapidly wears away the points of the pens used in signing the notes if the signatures happen to come on the printed impression. The object of this invention is to obtain a green ink which is not liable to the above objection, and which at the same time is indestructible.]

37,985.—Sewing Machine.—Mervin R. Smith, Armonck, N. Y.:

I claim, first, The combination of the needle-operating cam, G, constructed as described, the shuttle-driving eccentric, J, and the feed lever, H, having an elongated slot, n, fitted with a slide, p, and deriving a positive motion in both directions from a crank wrist, k, the whole arranged and operating substantially as set forth to cause the machine to operate with the driving shaft or pulley rotating in either direction and the feed to be reversed by reversing the direction of the said shaft or pulley.

Second, The combination with each other and with the isolated portion of the flat bed constituting a cylinder or its equivalent, of the shuttle-driving eccentric, J, rod, M, rock-shaft, L, arm, N, rod, P, and feed-operating crank wrist, k, the whole arranged and operating substantially as and for the purpose herein specified.

Third, The slide, y, guide bar, w, and spring, z, combined with each other and the shuttle, substantially as and for the purpose herein specified.

37,986.—Coal-oil Lamp.—Charles F. Spencer, Rochester, N. Y.:

I claim connecting the deflector and chimney with the wick tube or cap, by means of the sliding shank, b, secured to the guide, G, or its equivalent, in such a manner that the shank is held firmly in place when lowered, but forms a joint when raised, so as to turn vertically the chimney and deflector back; the whole arranged, combined and operating, substantially as herein set forth.

37,987.—Attachment for converting Burning-fluid Lamps into Coal-oil Lamps.—Abner G. Tisdel & William Nash, Watertown, N. Y.:

We claim the two prongs, A A, provided at their upper parts with perforated cap-shaped terminals and slotted at their lower parts to form arms, b, which are connected to a suitable clamp, all arranged as and for the purpose herein set forth.

[This invention relates to a new and simple contrivance which may be applied to the tube of an ordinary burning-fluid lamp for the purpose of rendering the same capable of burning coal-oil without the aid of a draught chimney. See engraving on another page.]

37,988.—Cultivator.—P. C. Van Brocklin, Buffalo, N. Y.:

I claim in cultivators having a triangular frame with a wheel at each corner, I claim supporting a caster wheel at the apex of the frame, in a socket or journal box which is hung upon a bolt or pin, in such a manner that it may turn or swing freely upon said bolt, in combination with a swivel lever shaft which connects with the wheel and extends upwardly for a handle, and operates as a swivel upon which the wheel turns freely, and which is connected with the forward wheels by means of rods, taking hold of the arms, I, below the frame; so that all of the wheels may be raised or lowered simultaneous by the driver, substantially as and for the purposes deseribed.

37,989.—Portable Fence.—Charles Van de Mark, Oaks Corner, N. Y.:

I claim interlocking the panels by means of the cleat, d, or its equivalent, on one panel, abutting against the cleat, b, and the top and bottom rails of the other panel; either with or without the other abutting cleats, c a, substantially as and for the purposes herein specified.

I also claim the brace, G, constructed and arranged substantially as specified, in combination with the construction and arrangement of the panels as described.

37,990.—Clasps for Paper Shade-holders.—Gustav Wedekind, Philadelphia, Pa.:

I claim the making of the clips at the top and inside of the ring so as to clasp the shade inside of the ring in the manner and for the purpose herein described and represented.

37,991.—Machine for rolling Green or Wet Leather.—Joel Whitney, Winchester, Mass.:

I claim, first, The combination of the rollers, B B P P, shaft, c, and screws, a a, with the devices, g i h j l k m p, in the manner described for the purpose of producing the effect described, upon wet leather.

Second, The hanger, j, cap, i, box or cylinder, h, and spring, q, in combination with the roller, B, in the manner and for the purpose described.

Third, The combination of the levers, k k, links, m m, and treadle, p, with the hanger, j, of the cap, i, in the manner and for the purpose described.

Fourth, The combination in a wet leather-rolling machine of the spring, g, lever arrangement, k l m p, and geared screw arrangement c e e b b a a, in the manner and for the purpose described.

37,992.—Apparatus for clasping Skirts.—Samuel R. Wilmot, Brooklyn, N. Y.:

I claim, first, The interposition of a spring, N, between the shaker, E e, and the concussive portion of the machine as represented.

Second, The projections, K K, and the recesses, K′ K′, and spring, P, arranged to operate relatively to the supporting piece, I i, or its equivalent substantially as and for the purpose herein set forth.

Third, The projections, L L, and the recesses, L′ L′, and spring, P, arranged to operate relatively to the supporting piece, L i, or its equivalent substantially as and for the purpose herein set forth.

37,993.—Die for forming Hats.—Robert T. Wilde & Samuel H. Lyon, Brooklyn, N. Y.:

We claim, first, The combination of a fixed bottom-piece, A, a fixed top-piece, C, and a series of interposed expanding pieces, D D E E, the whole constructed and arranged to operate substantially as herein specified for the purpose set forth.

Second, So combining the several expanding pieces, D D E E, with each other and with a cam, H, attached to the die or block, that the said pieces may be operated simultaneously as herein described, to produce the contraction and expansion of the die or block without the removal and re-insertion of any portion of the die or block.

37,994.—Clothes-ironing Machine.—Stephen W. Woodward, Buffalo, N. Y.:

I claim, first, The hollow metallic table, B, when heated by a flame of gas or spirit lamp, and constructed and used for the purpose of ironing clothes thereon, as described.

Second, Operating the smoothing-iron, E, by means substantially as described, in combination with the hollow metallic table, B, for the purposes set forth.

37,995.—Divider for Harvesting Machines.—W. A. Wood, Hoosick Falls, N. Y.

I claim an outside shoe or divider having an enlarged open space over and behind the finger bar, to which it is fastened, and the upper and under portion of whose front approach each other near enough for the cutter to pass through without being united, substantially as and for the purpose herein described.

37,996.—Needle.—Augustine I. Ambler (assignor to himself, R. N. Ambler and Warrick Martin), Milwaukie, Wis.:

I claim a needle made with a lateral beveled opening into the eye, and an increased thickness of metal on the side of the needle opposite the opening, all as herein shown and described.

[This invention consists mainly in making a slot in one side of a the eye of a needle to permit the thread to be inserted in a lateral direction, which is much easier than to insert it lengthwise directly through the eye.]

37,997.—Electric Telegraph.—Alexander Bain (assignor to himself and William H. Allen), New York City:

I claim, first, The finger plate provided with the cavities or holes corresponding with the sign to be transmitted, said plate in its revolution making and breaking the electrical circuit, substantially as set forth.

Second, I claim the stop, C, in combination with the said finger plate, for the purposes and as specified.

Third, I claim the dial, m, and hand, n, actuated substantially as shown, in combination with said finger plate, for receiving the message, as specified.

Fourth, I claim the movable dials or rings applied to the transmitting and receiving instruments, whereby the telegraphic communication can only be understood by the sender and receiver, as set forth.

Fifth, I claim the finger plate supported at or near its circumference, so that the interior of said finger plate may be open for exhibiting the dial, m, and hand, n, as set forth.

37,998.—Coppering Iron Vessels.—William B. Barnard (assignor to himself and Samuel G. Blackman), Waterbury, Conn.:

I claim the combination of Japan varnish, or any other suitable insulating substance or material, with the copper sheathing of an iron or iron-plated vessel, when said sheathing is attached to the vessel by means of metallic rivets, secured within enlarged cavities formed in the iron work of the hull of said vessels, substantially in the manner and for the purpose herein set forth.

37,999.—Wood-saw Frame.—Erastus W. Bates, Waterville, Maine, assignor to John Ellis, North Bridgewater, Mass.:

I claim the combination of the strap, E, pivoted to the base, D, the lever, G, with its cam, f, pivoted to the strap, and the plate, I, with its indentions, i, applied to the head of the bar, B, in the manner specified.

38,000.—Rifling Machine.—George W. Bigelow (assignor to H. B. Bigelow), New Haven, Conn.:

I claim the combination of the cross-head trip, i, and lever, d, with the rack, N, and pinion, O, when the same are combined to operate substantially as and for the purpose specified.

38,001.—Coal-oil Lamp for Locomotives.—Peter Budenbach (assignor to E. R. Bennett), New York City:

I claim first, Attaching the button, I, to a sliding tube, G, which is fitted within the tube, E, all arranged as shown, to support the bottom in proper position and admit of the ready adjustment of the same as set forth.

Second, The perforated cylinder, B, attached to the lower end of the outer tube, A, of the lamp, when said cylinder is made to project below said tube and form an extension of the same, as and for the purpose set forth.

The bridge in the oil-chamber, K, formed of the curved top plate, c, and perforated sides, d d, and provided with a perforated cylinder, M, any one or all of the perforated parts being used as and for the purpose specified.

Fourth, The perforated partition plate, J, in the wick chamber, b′, as and for the purpose set forth.

[The object of this invention is to obtain a lamp for burning coal oil, which may be used as a head light for locomotives, and operate better than the whale-oil lamps hitherto used, and one which it is believed possesses advantages over the coal-oil lamps hitherto constructed for a similar purpose.]

38,002.—Corn-sheller.—Thomas D. Burrall (assignor to William D. Burrall), Geneva, N. Y.:

I claim the circular hopper, e, provided with a recess for receiving the curved spring, o, in the manner and for the purposes specified.

38,003.—Purifying Cast-iron.—S.W. Kirk, Coatesville, Pa., assignor to himself and C. E. Stotsenburg, Wilmington, Del.:

I claim the use of the binoxide or hyperoxide of black manganese, with or without the addition of the sesquioxide of iron, introduced to the iron when the iron is perfectly fluid, for the purpose of washing out the impurities, substantially in the manner and for the purpose set forth.

38,004.—Grain Elevator.—C. W. T. Krausch, Chicago, Ill., assignor to himself and David Howes, of Dubuque, Iowa:

First, I claim providing the tube, E, with a receiving and discharging bonnet, E′, substantially as and for the purpose set forth.

Second, I claim so connecting the receiving swinging tube, E, with the stationary tube, B, that a revolution may be simultaneously imparted to the screws of both tubes, and such motion continued, whether the tube, E, be elevated or depressed, or swung out from or swung in toward the wall, A, during the act of elevating the grain.

Third, I claim connecting the swinging receiving tube, E, with the stationary tube, B, by means substantially as and for the purpose described.

Fourth, I claim the combination of the swinging receiving tube, E, screw, I, and cap, E′, and counter-balancing weights, p3, for the purpose set forth.

Fifth, I claim the combination of a series of tubes, E B and B′, and a series of elevating screws, I and I′, the whole being combined, arranged and operating substantially in the manner and for the purpose set forth.

38,005.—Composition for water-proofing Fabrics.—Edwin L. Simpson, Monroe, Conn., assignor to himself and Jared Wilson Post, New Haven, Conn.:

I claim, first, A water-proof compound composed, in the manner described, of gutta-perch and camphene or naphtha, for the purpose and substantially as herein set forth.

Second, I claim the compound produced by combining with the liquid gutta-percha, prepared as described, benzine, camphene and boiled vegetable oil, in the manner and for the purpose substantially as herein set forth and described.

38,006.—Manufacture of Flocked Water-proof Fabrics.—Edwin L. Simpson, Monroe, Conn., assignor to himself and Jared Wilson Post, New Haven, Conn.:

I claim the coating water-proof fabrics, in the manner herein described, with flocks, or similar material, when the said fabrics are prepared in the manner substantially as herein set forth.

38,007.—Track-clearer for Harvesters.—J. O. Taber (assignor to himself, C. R. Taber and W. S. Stetson), Salem, Ohio:

I claim, first, The method of attaching the swath-board, C, to the shoe, B, of the finger-bar, as herein shown and described, to wit: by means of the pin, c, secured transversely in the swath-board, and the recesses, b b, in the sides of the slot, a, of the shoe, B, the pin being fitted in the recesses, and the inner end of the swath-board bearing against the inner edge of the slot.

Second, Attaching the arm, D, to the swath-board, C, by means of the socket, E, which is provided with a plate, e, having a curved slot, f, in it through which a screw, g, passes, the socket being attached to the swath-board by a screw, d, which is at the center of a circle of which the curved slot, f, forms a part, as and for the purpose herein set forth.

[This invention relates to a new and improved mode of attaching the swath-board to the shoe of the finger-bar, whereby the swath-board may be attached to and detached from the shoe with the greatest facility, and, when attached to the shoe, held firmly in proper position. The invention further relates to a new and improved mode o attaching the arm to the swath-board, whereby the former may be readily adjusted higher or lower, according to the hight of the grass, and a clean track always obtained, whatever the hight of the grass may be.]

38,008.—Composition for Printing and Copying Ink.—John Underwood and Frederick V. Burt, London, England, assignors to Waldo Maynard and Charles R. Thayer, Boston, Mass. Patented in England, September 19, 1856:

We claim our new manufacture of printing and copying ink as made of soap and other materials, and in manner substantially as hereinbefore described.

38,009.—Clasp for Shoes, Belts, &c.—Edward S. Winchester (assignor to himself and Joseph Gardner, Jr.), Boston, Mass.:

I claim the clasp constructed substantially as above described.

38,010.—Hair-crimper.—Henrietta H. Adams, New York City:

I claim, first, A double hair-crimper adapted for use in reversed positions, substantially as herein described.

Second, In combination therewith a hinge or hinges applied substantially as set forth, to adapt the machine for use in either position.

Third, The hook, D, or other suitable catch or fastening, in the described combination with the double hair-crimper.

38,011.—Stump Extractor.—J. Herrington Hendee, Blackman township, Mich.:

I claim, first, Making the horizontal beam, E, serve the double purpose of a draught beam for the sled and a purchase for the lever, G, as herein described.

Second, The auxiliary beam, H, arranged as described, in combination with the sled runners, A A, and lever, G, as herein described.

Third, The fulcrum plates, h and h′, and lips, i i, or their equivalents, in combination with the lever, G, and transverse bridge-tree C, substantially as described.

Fourth, Combining with sled runners, A A, spread out at their rear ends, the standards, A A, bridge-tree, C, lever, G, draught beam, E, pulleys, g g′, s s′, and rope, k, substantially as described.

38,012.—Beehive.—S. McClanathan, Warsaw, Ill.:

I claim the combination and arrangement of the hive sections and interchangable boxes, or drawers, substantially as and for the purposes herein specified.

I also claim the projecting funnel-shaped entrance tubes, with their ventilating caps, substantially as specified.

38,013.—Device for operating Churns.—Oran W. Seely, Syracuse, N. Y.:

I claim the employment of the vertical reciprocating connecting rod, a, working in guide, D′, in combination with the dash churn and the balanced lever, arranged and operating in the manner and for the purposes substantially as described.

38,014.—Construction and Defense of War Vessels.—Otis Tufts, Boston, Mass.:

I claim the recess in the sides, substantially as and for the purpose

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described, such recess being formed by bending inwards the frames and the plating thereon.

I claim forming the fixture, m, which is secured in the hull, substantially as and for the purpose set forth.

I claim compressing an armor compounded of iron and of wood, or other equivalent therefor, by means of screw bolts attached to the fixture, m, substantially as shown.

I claim securing defensive armor to a hull by means of bolts jointed to fixtures, m, substantially as and for the purposes specified.

I claim the employment of the straps, g, in connection with the screw bolts, f, and the fixture, m, for the purpose of securing the compound armor to the hull.

38,015.—Composition for Burning Fluid.—Charles N. Tyler, Buffalo, N. Y.:

I claim, first, The compound produced by the combination of the mineral or earthy oils with fusil oil, in the manner and for the purpose substantially as herein set forth, said compound constituting a new manufacture.

Second, I also claim the compound produced by the combination of naphtha with alcohol and fusil oil.

Third, I also claim the heavy liquid obtained by treating the combination of petroleum or kerosene and fusil oil with alcohol.

38,016.—Ore-washer.—Thomas Wise, Boston, Mass.:

I claim taking the combined ore and water direct from the stamp-heads, and separating the metal in various grades by means of forced currents of air injected beneath the water within a series of tight boxes set upon pivots, one above another, all as herein shown and explained.

[The subject of this invention is a device for taking the ore directly from the stamp-heads and washing it and separating it into various grades at a single operation.

38,017.—Treating Gas for Illumination.—Warren A. Simonds, of Boston, Mass., and Seth Warner, of East Hampton, Mass., assignor to said Seth Warner, Oliver Warren, of North Hampton, and Albert L. Fernald, of Boston, Mass.:

We claim forcing the gas thus made through a mixture of alcohol and chloride of lime, thereby effecting such a change in said gas that it is not liable to refrigeration or condensation; and also so decarbonizing said gas as to prevent smoke while burning and prepare it for any kind of burner.

38,018.—Broiler.—James M. Dick, Buffalo, N. Y.:

I claim, first, The flexible apron, B, when constructed and operating as and for the purposes described.

Second, The reel, A, flexible apron, B, and box, O, when used in combination for the purposes as described.

RE-ISSUES.

1,440.—Sash-fastener.—James C. Butterworth, Providence, R. I. Patented April 16, 1861:

First, I claim the combination of the friction pad with cam, B, substantially as described and for the purpose set forth.

Second, I claim the combination of the cam recessed and furnished with the friction pad, substantially as described, with the plate and spring, for the purposes herein set forth.

1,441.—Trap for Steam Apparatuses.—Thomas Sault, Seymour, Conn. Patented Feb. 28, 1860:

I claim the employment, in a trap for steam apparatuses, of a valve of vulcanite applied to operate substantially as described, between two opposite seats in a box of metal or other material, whose expansibility by heat is less than that of the valve.

[This invention consists in a valve of what is known in the india-rubber and gutta-percha manufactures as vulcanite, so applied within a box, of metal or other material, attached to a steam radiator or heater, or to any other steam apparatus, where a trap is required, as to provide, by the agency of its vastly greater contraction and expansion, with changes of temperature, as compared with the material of which the box is made, either for the escape of any air or water that may hav collected within the steam space before the admission of air, to prevent the collapse of the apparatus by the formation of a vacuum therein after the steam has been shut off—in either case preventing the escape of steam.]

DESIGNS.

1,740.—Stove.—David L. Bartlett (assignor to himself, Jonas H. Hayward and H. W. Robbins), Baltimore, Md.

1,741.—Stove.—Samuel W. Gibbs, Albany, N. Y., assignor to Buck & Wright, St. Louis, Mo.

1,742.—Stand of an Eyelet Machine.—Joseph A. Safford, Winchester, Mass.

1,743.—Picture Frame.—Samuel Sailor, Philadelphia, Pa.

TO OUR READERS.

RECEIPTS.—When money is paid at the office for subscriptions, a receipt for it will always be given; but when subscribers remit their money by mail, they may consider the arrival of the first paper a *bona fide* acknowledgment of our reception of their funds.

INVARIABLE RULE.—It is an established rule of this office to stop sending the paper when the time for which it was pre-paid has expired.

NEW PAMPHLETS IN GERMAN.—We have just issued a revised edition of our pamphlet of *Instructions to Inventors*, containing a digest of the fees required under the new Patent Law, &c., printed in the German language, which persons can have gratis upon application at this office. Address MUNN & CO.,
No. 37 Park-row, New York.

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It is important that all works of reference should be well bound The SCIENTIFIC AMERICAN being the only publication in the country which records the doings of the United States Patent Office, it is preserved by a large class of its patrons, lawyers and others, for reference Some complaints have been made that our past mode of binding in cloth is not serviceable, and a wish has been expressed that we would adopt the style of binding used on the old series, *i. e.*, heavy board sides, covered with marble paper and morocco backs and corners.

Believing that the latter style of binding will better please a large portion of our readers, we shall commence on the expiration of this present volume to bind the sheets sent to us for the purpose in heavy board sides, covered with marble paper and leather backs and corners

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Notes and Queries

J. C. B., of N. Y.—Boil the knife-handles in oil.

J. W. R., of N. Y.—The only method to obtain good hard candles from tallow or lard is to extract the oil.

R. R., of Ill.—The vapor of any volatile fluid and steam when passed into a vessel containing air or gas, will add its elastic force to the elastic force of the air in the vessel. Air heated to 491° Fah., doubles its volume, and its pressure is increased one atmosphere or 15 pounds on the square inch. According to Dr. Dalton a vessel filled with dry air will require as much steam as if it had been void of air. Generators combining the use of hot air and steam for driving engines have been tried, but no advantage has resulted from them.

C. P., of N. Y.—We are unable to appreciate the advantages you claim for your gun over others which have been proposed and used.

A. B. T., of Mich.—We should think your improvement in plows contained some patentable novelty. Before proceeding with the case we shall require a model and advance payment of Government fee ($15); also $1 to pay the revenue stamp-tax on "power.' You must put the date on your patent. Those rock crystals to which you refer are very common and of no value. We never heard of a diamond being found in this State, though many no doubt cherish the same idea with yourself—that simply because the stone scratches glass, the stone must be a diamond.

B. B., of Ind.—Procure Holley's "Railway Practice."

F. R. C., of Mass.—We do not think your expanding screw patentable. Those referred to in our paper were patented about seven years ago.

F. M., of Baden.—We received your former communication respecting Wilson's knitting machine and duly forwarded it to his address. Why it has not been answered we cannot say, though we are of the opinion that none of his machines are ready for market. We have done all in our power to promote your interests in the matter, and if the party to whom the letters were written will not reply to them, we cannot help it. Your second letter has been sent to his address.

C. W., of C. W.—The best and safest way to remove the fatty substance on hides is by scraping with a suitable knife when they are wet. Alkaline lyes remove grease, but they are not safe to use for hides, as the alkali tends to injure the gelatinous tissue. Lime was formerly used for removing the hair, also for extracting the fatty parts of hides.

A. W. D., of N. Y.—You will find the illustration and description of a gun for firing under water on page 320, Vol. VI, (new series) of the SCIENTIFIC AMERICAN. The interior of a *Monitor* gun-turret is 19¼ feet in diameter, and the length of a 15-inch gun is 13 feet 5 inches. The recoil is taken up with powerful spring buffers. Flat-fronted shot are the best for firing in water. One of Whitworth's bolts has passed through thirty feet of water and then penetrated several inches into oak planking.

Money Received

At the Scientific American Office, on account of Patent Office business, from Wednesday, March 25, to Wednesday, April 1, 1863:—

P. J. C., of Conn., $45; G. H. S., of Iowa, $20; G. H. R., of N. Y., $15; J. McC., of N. Y., $42; L. W., of N. Y., $20; E. C. H., of N. Y., $16; F. D. B., of Ind., $20; J. E. T., of Pa., $20; J. R., of N. Y., $22; I. L., of N. Y., $41; A. F. W., of N. Y., $16; W. C. O., of N. Y., $16; S. and W., of Mass., $41; A. L., of N. J., $25; J. H., of Ohio, $20; J. H., of Ill., $20; F. P. S., of N. Y., $48; J. J. McC., of N. Y., $16; J. F. J. G., of N. Y., $16; T. and P., of Conn., $45; G. T. L., of Pa., $41; O. L., of N. Y., $16; L. M., of N. Y., $16; J. J. M., of Conn., $44; D. D., of N. Y. $26; G. F. J. C., of N. J., $20; G. W., of N. Y., $26; D. H., of N. Y., $25; W. H., of N. Y., $26; G. E. H., of N. Y., $16; G. S., of Mass., $25; O. A. H., of N. Y., $16; F. N., of Conn., $16; R. B. D., of Pa., $25; S. and F., of R. I., $16; E. P., of Ill., $15; A. and M., of Wis., $12; L. W., of Ky., $10; A. W., of Ill, $34; S. S., of Pa., $16; F. L. S., of Pa., $26; N. L., of Ill., $12; J. F. R., of N. Y, $250; J. G. R., of C. T., $18; C. C. S., of Ill., $15; G. C. E., of N.Y., $26; W. F., of Conn., $16; N. E. S., of Iowa, $16; W. H. O., of Wis. $15; V. W. B., of Vt., $15; J. J. C., of Wis., $25; D. G. H., of Mass., $45; L. D., of Mass., $26; B. F. S., of Iowa, $25; J. B. W., of Mass., $30; H. and W., of Ohio, $16; G. N. D., of Ky., $15; J. B. E. and Co., of Iowa, $15; S. S. and D. C., of Ill., $16; S. C., of N. Y., $25; G. P. H., of N. Y., $25; H. Van D., of Mass., $25; C. O., of N. Y., $25; H. D. W., of Mass., $35; T. and J. W. W., of Ill., $16; J. M., of Ky., $16; W. and P., of Mass., $25; M. V. B. W., of Ill., $25; W. H. S., of Ill., $26; C. T. B., of N. J., $50.

Persons having remitted money to this office will please to examine the above list to see that their initials appear in it, and if they have not received an acknowledg ent by mail, and their initials are not to be found in this list, they will please notify us immediately, and inform us the amount, and how it was sent, whether by mail or express.

Specifications and drawings and models belonging to

parties with the following initials have been forwarded to the Patent Office from Wednesday, March 25, to Wednesday, April 1, 1863:—

J. McC., of N. Y., (2 cases); E. C. H., of N. Y; I. L., of N. Y.; S. and W., of Mass.; J. J. M., of Conn.; G. T. L., of Pa.; J. R., of N. Y.; D. D., of N. Y.; J. A. T., of Mass.; G. F. J. C., of N. J.; G. W., of N. Y.; S. E. T., of N. J.; J. C. C., of N. Y.; D. H., of N. Y.; W. H., of N. Y.; D. B. D., of Pa.; G. S., of Mass.; A. W., of Ill.; M. V. B. W., of Ill.; U. H. S., of Ill.; E. H., of Mass.; W. and P., of Mass.; H. Van D., of Mass.; H. D. W., of Mass.; C. O., of N. Y.; J. B. W., of R. I.; F. L. S., of Pa.; S. C., of N. Y.; G. B. H., of N. Y.; J. J. C., of Wis.; D. G. H., of Mass.; L. D., of Mass.; J. B. G. M. F. P., of France; C. T. B., of N. Y.; G. C. E., of N. Y.

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BUREAU OF ORDNANCE.

NAVY DEPARTMENT,
Washington City, March 2, 1863.

This Bureau is desirous of ascertaining whether rifled cannon can be made of wrought iron of sufficient and uniform endurance and economy to warrant their being preferred to guns of cast iron only, or of cast iron strengthened with wrought iron.

Proposals will therefore be received from any manufacturers of forged iron, to furnish a finished gun, or a block of metal from which the same may be finished.

The said gun, when finished, to weigh about 10,000 pounds, to be made into a gun throwing a projectile of 100 pounds, as used in cast iron rifled cannon of like weight, to be fired 1,000 times with service charges of the same weight and kind of powder as used in the Parrott 100-pounder, viz: 10 pounds of No. 7, without bursting or wearing in such a manner as to cause apprehensions of bursting.

The quality of metal, price, and other terms, are to be stated clearly in the proposals forwarded.

The Bureau reserves the right to itself of accepting or rejecting any of the proposals.

The time for receiving the proposals is limited to thirty days from date; and proposals will only be received from persons actually engaged in the fabrication of wrought iron.

JOHN A. DAHLGREN, Chief of Bureau.

15 8

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It is a well established fact, that when coal is burned in open grates, the greatest portion of the heat, instead of being radiated out into the room, escapes up the chimney, and thus fails of creating any useful effect. There are dampers provided to grates generally, and these lie in the throat of the chimney. Their employment cannot be advocated as they are injurious to health. The gases of the burning fuel are deflected from the dampers into the room and render the air very impure in a short time. A very simple device designed to correct this evil, and at the same time derive the full benefit from the coal, is here illustrated. Fig. 1, is a perspective view; it is simply a metallic case, A, having a partition, B, or diaphragm placed across it. The upper flange, *a*, of the radiator, has a small angle iron, *b*, attached to it, which fits over the iron plate, *c*, let into the chimney front. The lower part of the radiator simply rests against the grate, the weight is supported by the plate, *d*, riveted to the inside of the case, A. The two handles, C, are made of a non-conductor, and do not get uncomfortably hot. The use of this apparatus is apparent to every one. When the apartments are not sufficiently warm to be agreeable, the radiator is applied and deflects the heated current into the case, as shown by the arrows; the cold air passing in through the bottom of the grate as usual, and issuing in a heated state through the case into the apartment, and thence out by the exit provided for it, as seen in Fig. 2. It will be seen that this radiator is also a very complete blower, and will stimulate the fire so as to burn freely. The diaphragm fits closely across the top of the fireplace and compels all the caloric to heat the atmosphere by radiation from the surfaces exposed. The apparatus is very neatly designed, and is we think destined to become popular. This radiator is the invention of John Watson, Jr., of Louisville, Ky., and a patent for it is now pending through the Scientific American Patent Agency. [See advertisement on another page.]

Fig 1

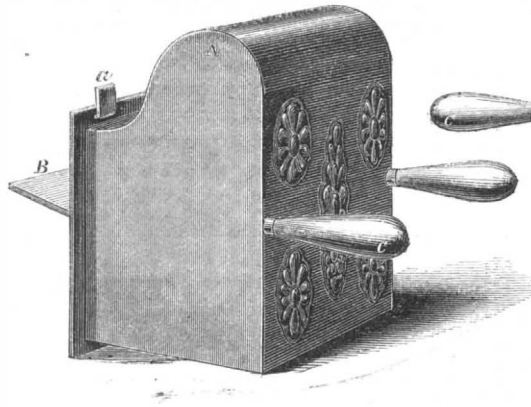
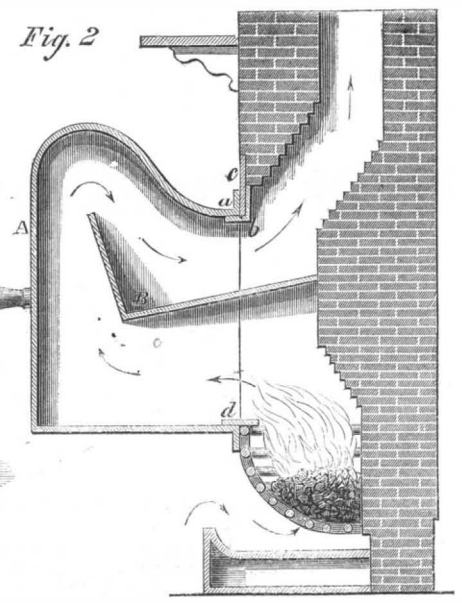


Fig. 2



WATSON'S HEAT RADIATOR.

Naval Hemp Cord.

In a paper read before the Institution of Mechanical Engineers, England, by C. P. B. Shelley, he stated that there were three rope-laying machines at Devon Dockyard, on which were made 3,000 tuns of cordage per year. Of this amount 2,000 tuns of cables and hawsers were made on the largest machine, varying from 14 to 24 inches in girth for the cables and from 7½ to 12½ inches in girth for the hawsers. The second machine of intermediate size made 100 tuns per annum of cable-laid ropes of from 8 to 16 inches in girth, and hawsers from 5½ to 7½ inches in girth. The smallest machine made 300 tuns of cables from 5½ to 7½ inches in girth, and shroud-laid ropes of 3½ to 5 inches in girth. Taking the breaking weight of rope made from Russian hemp at 100, that of Italian hemp is 107, and that of Manilla 73. Tarred rope is weaker than untarred rope. The strongest ropes are three-strand hawsers, made of untarred Italian hemp.

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A lady reader of the Scientific American states that she has never seen "a good grater for grating large and hard substances—such as cocoa-nuts, &c.—without grating the fingers also." Such a grater she considers would be a *great* thing for all good housewives. Such a "domestic institution" can undoubtedly be furnished by our inventors, as they are the most gallant set of mortals on this "terrestrial ball." What have they not done for the fair sex within the past few years? Sewing, knitting, and washing machines, and other articles too numerous to mention here, have been provided by them to abridge domestic toil; and we are confident that the ladies have but to suggest desired improvements for the consideration of our inventors, to have their wishes responded to with zeal and alacrity.

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Various expedients have been resorted to, from time to time, in order to obtain a suitable device for

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This burner is the invention of Messrs. A. G. Tisdel and William Nash, of Watertown, N. Y. The patent was issued last week, through the Scientific American Patent Agency, and the claims will be found in another column. [See advertisement on another page.]

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